PROJECT MANUAL

TRUMANN MIDDLE SCHOOL
SYSTEMS REPLACEMENT

#2526-5605-001

TRUMANN SCHOOL DISTRICT
TRUMANN, ARKANSAS 72472

PROJECT NUMBER 2402
MARCH 20, 2026

STEILING ARCHITECTURE
2912 Longview Dr. • Jonesboro, AR 72401
870.933.6993 • www.steilingarch.com

SECTION 00 0101
PROJECT TITLE PAGE

TRUMANN MIDDLE SCHOOL - MIDDLE SCHOOL SYSTEMS REPLACEMENT
FACILITIES PROJECT #2526-5605-001

OWNER:
TRUMANN SCHOOL DISTRICT
221 N. PINE AVENUE
TRUMANN, ARKANSAS 72472

ARCHITECT:
STEILING ARCHITECTURE
ARCHITECT'S NUMBER: 2402

DATE: FEBRUARY 03, 2026

SECTION 00 0107
SEALS PAGE

THE ARCHITECT-OF-RECORD FOR
TRUMANN MIDDLE SCHOOL - MIDDLE SCHOOL SYSTEMS REPLACEMENT

TRUMANN SCHOOL DISTRICT
TRUMANN, ARKANSAS
ARCHITECT'S # 2402

SPECIFICATIONS DIVISIONS 1 THROUGH 14 AND 31 THROUGH 35, IS:



"I, HEREBY CERTIFY THAT THESE PLANS AND SPECIFICATIONS HAVE BEEN PREPARED BY ME OR UNDER MY SUPERVISION. I FURTHER CERTIFY, THAT TO THE BEST OF MY KNOWLEDGE THESE PLANS AND SPECIFICATIONS ARE AS REQUIRED BY LAW AND IN COMPLIANCE WITH THE ARKANSAS FIRE PREVENTION CODE FOR THE STATE OF ARKANSAS."

_____ **DATE** 03/20/2026

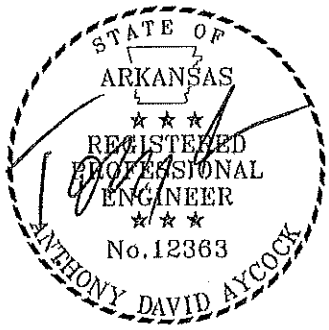
END OF SEALS PAGE

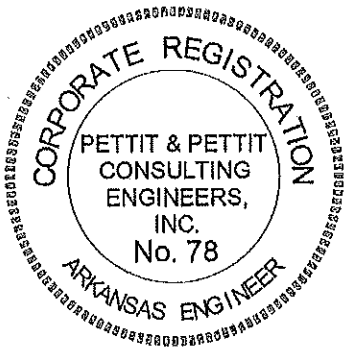


The Engineer of Record for Divisions 26 and 28 of the Specifications for the Systems Replacement Project, Trumann Middle School, Trumann, Arkansas (P&P Job No. 25-076) is:

3-20-26

Date





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PETTIT & PETTIT
CONSULTING ENGINEERS, INC.

The Engineer of Record for Divisions 21, 22, and 23 of the Specifications for the Systems Replacement Project, Trumann Middle School, Trumann, Arkansas (P&P Job No. 25-076) is:

3-20-26

Date





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CONSULTING ENGINEERS, INC.

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END OF SECTION

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PROJECT FORMS

TRUMANN MIDDLE SCHOOL - SYSTEMS REPLACEMENT

BOND FORMS REQUIRED:

2.01 PERFORMANCE AND PAYMENT BONDS:

A. Performance and Payment Bonds, AIA Document A312, March 1987 Edition

B. The "Performance and Payment Bond" will be in the amount equal to 100% of the contract price as security for the faithful performance of this contract price and for payment of all indebtedness for labor and materials furnished or performed in connection with this contract. The bond will be written by a surety company which is qualified and is authorized to do business in the State of Arkansas, according to A.C.A. 22-9-402(a)(b) and filing with said bond, his power of attorney as his authority. The bond will be written in favor of **Nabholz Construction Services, Inc.**,and executed per Arkansas state law. An original and two (2) copies of the bond must be furnished, with power of attorney attached to each. The Contractor will file and record the original with the Clerk in the Circuit Court of Poinsett County. The Contractor is to pay all expense incidentals to file the bond. The remaining two copies should be certified by the Clerk to evidence the filing of the original and these two copies submitted to the Construction Manager.

2.02 INSURANCE CERTIFICATES REQUIRED:

A. G715 Supplemental Attachment for Accord Certificate of Insurance (25-2) 1991

END OF SECTION

AIA® Document A312® – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

Nabholz
3415 One Place
Jonesboro, AR 72404

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Trumann School District No. 21
221 Pine Avenue
Trumann, AR 72472

CONSTRUCTION CONTRACT
Date: 02-18-2026
Amount: $
Description:
(Name and location)
2402-Trumann Schools-Middle School Systems Replacement

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond:

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Company: *(Corporate seal)*	Company: *(Corporate seal)*
CONTRACTOR AS PRINCIPAL *(Signature)*	**SURETY** *(Signature)*
(Printed name and title)	*(Printed name and title)*

(Any additional signatures appear on the last page of this Performance Bond)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Brandie Williams
221 Pine Avenue
Trumann, AR 72472
brandie.williams@trumannwildcat.com

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

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.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

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Additions and Deletions Report for
AIA® Document A312® – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 11:07:35 CST on 02/18/2026.

Changes to original AIA text

There are no edits to the original text

Variable Information

PAGE 1

CONTRACTOR:
(Name, legal status and address)

Nabholz
3415 One Place
Jonesboro, AR 72404

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Trumann School District No. 21
221 Pine Avenue
Trumann, AR 72472

CONSTRUCTION CONTRACT
Date: 02-18-2026
Amount: $
Description:
(Name and location)
2402-Trumann Schools-Middle School Systems Replacement

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Brandie Williams
221 Pine Avenue
Trumann, AR 72472
brandie.williams@trumannwildcat.com

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Certification of Document's Authenticity

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I, Jeffrey B Steiling, AIA, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:07:35 CST on 02/18/2026 under Order No. 20250107536 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ - 2010, Performance Bond, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

PRESIDENT / ARCHITECT

(Title)

02/03/2026

(Dated)

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AIA® Document A312® – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

Nabholz
3415 One Place
Jonesboro, AR 72404

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Trumann School District No. 21
221 Pine Avenue
Trumann, AR 72472

CONSTRUCTION CONTRACT
Date: 02-18-2026
Amount: $
Description:
(Name and location)
2402-Trumann Schools-Middle School Systems Replacement

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond:

ADDITIONS AND DELETIONS:
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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Company:	*(Corporate seal)*	Company:	*(Corporate seal)*
CONTRACTOR AS PRINCIPAL *(Signature)*		**SURETY** *(Signature)*	
(Printed name and title)		*(Printed name and title)*	

(Any additional signatures appear on the last page of this Payment Bond)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Brandie Williams
221 Pine Avenue
Trumann, AR 72472
brandie.williams@trumannwildcat.com

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- **.1** have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- **.2** have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under

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this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

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§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

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Changes to original AIA text

There are no edits to the original text

Variable Information

PAGE 1

CONTRACTOR:
(Name, legal status and address)

Nabholz
3415 One Place
Jonesboro, AR 72404

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Trumann School District No. 21
221 Pine Avenue
Trumann, AR 72472

CONSTRUCTION CONTRACT
Date: 02-18-2026
Amount: $
Description:
(Name and location)
2402-Trumann Schools-Middle School Systems Replacement

AGENT or **BROKER:**

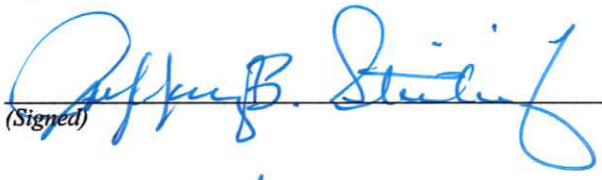
OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Brandie Williams
221 Pine Avenue
Trumann, AR 72472
brandie.williams@trumannwildcat.com

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

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(Signed)

PRESIDENT/ARCHITECT

(Title)

02/03/2026

(Dated)

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Supplemental Attachment for ACORD Certificate of Insurance 25

PROJECT: *(name and address)* 2402-Trumann Schools-Middle School Systems Replacement Trumann, AR	**CONTRACT INFORMATION:** Contract For: Systems Replacement Date: 02-18-2026	**CERTIFICATE INFORMATION:** Producer: Insured: Date:
OWNER: *(name and address)* Trumann School District 221 Pine Avenue Trumann, AR 72472	**ARCHITECT:** *(name and address)* Steiling Architecture, PA 2912 Longview Dr Jonesboro, AR 72401	**CONTRACTOR:** *(name and address)* Nabholz 3415 One Place Jonesboro, AR 72404

A. General Liability		**Yes**	**No**	**N/A**
1.	Does this policy include coverage for:			
a	Damages because of bodily injury, sickness, or disease, including occupational sickness or disease, and death of any person?	[ ]	[ ]	[ ]
b	Personal injury and advertising injury?	[ ]	[ ]	[ ]
c	Damages because of physical damage to or destruction of tangible property, including the loss of use of such property?	[ ]	[ ]	[ ]
d	Bodily injury or property damage arising out of completed operations?	[ ]	[ ]	[ ]
e	The Contractor's indemnity obligations included in the Contract Documents?	[ ]	[ ]	[ ]
2.	Does this policy contain an exclusion or restriction of coverage for:			
a	Claims by one insured against another insured, where the exclusion or restrictions is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim?	[ ]	[ ]	[ ]
b	Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor?	[ ]	[ ]	[ ]
c	Claims for bodily injury other than to employees of the insured?	[ ]	[ ]	[ ]
d	Claims for the Contractor's indemnity obligations included in the Contract Documents arising out of injury to employees of the insured?	[ ]	[ ]	[ ]
e	Claims for loss excluded under a prior work endorsement or other similar exclusionary language?	[ ]	[ ]	[ ]
f	Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language?	[ ]	[ ]	[ ]
g	Claims related to residential, multi-family, or other habitational projects?	[ ]	[ ]	[ ]
h	Claims related to roofing?	[ ]	[ ]	[ ]
i	Claims related to exterior insulation finish systems, synthetic stucco, or similar exterior coatings or surfaces?	[ ]	[ ]	[ ]
j	Claims related to earth subsistence or movement?	[ ]	[ ]	[ ]
k	Claims related to explosion, collapse, and underground hazards?	[ ]	[ ]	[ ]

B. Other Insurance Coverage		**Yes**	**No**	**N/A**
1.	Indicate whether the Contractor has the following insurance coverages and, if so, indicate the coverage limits for each.			
a	Professional liability insurance Coverage limits:	[ ]	[ ]	[ ]
b	Pollution liability insurance Coverage limits:	[ ]	[ ]	[ ]

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c	Insurance for maritime liability risks associated with the operation of a vessel Coverage limits:	[ ]	[ ]	[ ]
d	Insurance for the use or operation of manned or unmanned aircraft Coverage limits:	[ ]	[ ]	[ ]
e	Property insurance Coverage limits:	[ ]	[ ]	[ ]
f	Railroad protective liability insurance Coverage limits:	[ ]	[ ]	[ ]
g	Asbestos abatement liability insurance Coverage limits:	[ ]	[ ]	[ ]
h	Insurance for physical damage to property while it is in storage and in transit to the construction site Coverage limits:	[ ]	[ ]	[ ]
i	Other:	[ ]	[ ]	[ ]

_____

(Signature)

_____

(Printed name and title)

_____

Date

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SECTION 00 7200
GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

SUPPLEMENTARY CONDITIONS

2.01 REFER TO DOCUMENT 00 7300 - SUPPLEMENTARY CONDITIONS FOR AMENDMENTS TO THESE GENERAL CONDITIONS.

END OF SECTION

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General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

2402-Trumann Schools-Middle School Systems Replacement
Trumann, AR

THE OWNER:
(Name, legal status and address)

Trumann School District
221 Pine Avenue
Trumann, AR 72472

THE ARCHITECT:
(Name, legal status and address)

Steiling Architecture, PA
2912 Longview Dr
Jonesboro, AR 72401

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

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§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the

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purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

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§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

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but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as

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constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The

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Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the

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Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

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§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

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§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

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§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

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.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

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§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others

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whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

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or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;

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.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed

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by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve

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the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to

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fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

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§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or

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approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in

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Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

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.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner

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may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially

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similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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Additions and Deletions Report for
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Changes to original AIA text

There are no edits to the original text

Variable Information

PAGE 1

2402-Trumann Schools-Middle School Systems Replacement

Trumann, AR

Trumann School District

221 Pine Avenue
Trumann, AR 72472

Steiling Architecture, PA

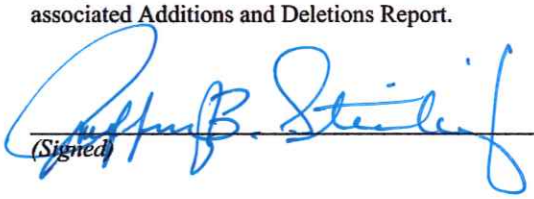
2912 Longview Dr
Jonesboro, AR 72401

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Certification of Document's Authenticity

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I, Jeffrey B Steiling, AIA, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 10:54:24 CST on 02/18/2026 under Order No. 20250107536 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ - 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.



(Signed)

PRESIDENT / ARCHITECT

(Title)

02/03/2026

(Dated)

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SECTION 00 7300
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 7200 - General Conditions and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

MODIFICATIONS TO AIA A201

4.01 ARTICLE 2.2 - INFORMATION AND SERVICES REQUIRED OF THE OWNER

A. Delete paragraph 2.2.5 and replace with the following:
   1. 2.2.5 The Contractor will be furnished free of charge a total of (5) sets of Contract Drawings and Project Manual. Additional sets will be furnished at the cost of reproduction, postage and handling.

4.02 ARTICLE 3.4 - LABOR AND MATERIALS

A. Add the following paragraphs:
   1. 3.4.3 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications).
   2. 3.4.4 By making requests for substitutions based on Subparagraph 3.4.3 above, the Contractor:
      a. represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
      b. represents that the Contractor will provide the same warranty for substitution that the Contractor would for that specified;
      c. certifies that the cost data presented is complete and includes all related costs under this Contract except that Architect's redesign costs, and waives all claims additional costs related to the substitution which subsequently become apparent; and
      d. will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be completed in all respects.

4.03 ARTICLE 3.9 - ON-SITE JOB SUPERINTENDENT

A. Add the following paragraph(s):
   1. 3.9.1. The minimum requirements for the on-site job superintendent for this project are as follows:
      a. Five (5) years of documented experience as an on-site JOB SUPERINTENDENT.
      b. Three (3) completed projects of similar project scope, square footage, construction cost, and complexity.
      c. When requested, provide the name of the three above referenced projects, Owner's name and contact information, and project Architect's name and contact information.

4.04 ARTICLE 5 - SUBCONTRACTORS

A. Add the following paragraph:
   1. 5.2.1.1 Not later than 15 days after the date of NOTICE TO PROCEED, the Contractor shall furnish in writing to the Architect the names of persons or entities proposed as manufacturers for each of the product identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the names of the installing Subcontractor.

4.05 ARTICLE 7 - CHANGES IN THE WORK

A. Add the following paragraph 7.1.4:

1. 7.1.4 References to the contractor calculating overhead and profit as part of Change Orders, Construction Change Directives and/ or Minor Change in the Work shall be replaced with the following maximum allowances:
    a. For the Contractor, for Work performed by the Contractor's own forces, 15 percent of the cost.
    b. For the Contractor, for Work performed by the Contractor's Subcontractor, 10 percent of the amount due the Subcontractor.
    c. For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, 10 percent of the cost.
    d. For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, 10 percent of the amount due the Sub-subcontractor.
    e. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.6.
    f. In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major costs items are Subcontracts, they shall be itemized also. In no case will a change involving over $250 be approved without such itemization.

4.06 ARTICLE 8 - TIME

A. Add the following subparagraph:

1. 8.1.5: Contract Time is identified in Section 004200 - Bid Proposal Form.

4.07 ARTICLE 9.3 - APPLICATIONS FOR PAYMENT

A. Add the following to paragraph to 9.3.1.:

1. The form of Application for Payment shall be notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet. Retainage shall comply with ACA 22-9-601.
2. 9.3.1.4 contractor shall submit 5 copies of Application for Payment.

4.08 ARTICLE 9.6 - PROGRESS PAYMENTS

A. Add the following:

1. The Owner may nullify the whole or any part of any Certificate for Payment previously issued, to such extend as may be necessary in its opinion to protect the Owner from loss because of:
    a. When periodic payments are made, then fivepercent (5%) will be withheld in accordance with Arkansas Code Annotated 22-9-601 et. seq.;
    b. Defective work not remedied;
    c. Third party claims filed or reasonable evidence indicating problem filing to such claims;
    d. Failure of the contractor to make payments properly to subcontractors or for labor, materials, or equipment, also see A2-12.2;
    e. Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum.
    f. Damage to the Owner or another contractor;
    g. Reasonable evidence that the work will not be completed within the contract time; or
    h. Persistent failure to carry out the work in accordance with the contract documents.

4.09 ARTICLE 9.7 - FAILURE OF PAYMENT

A. Delete paragraph 9.7.1.

4.10 ARTICLE 10.2 - SAFETY OF PERSONS AND PROPERTY

A. Add the following paragraph:
   1. 10.2.4.1 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary, the Contractor shall give the Owner reasonable advance notice.

4.11 ARTICLE 11.1 - CONTRACTOR'S LIABILITY INSURANCE

A. Refer to 11.1.1.
   1. In the fourth line following the word "located" insert the words "to which the Owner has no objections".

B. Refer to 11.1.1.8
   1. Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:
      a. Premises Operations (including X, C, and U coverage's as applicable).
      b. Independent Contractor's Protective.
      c. Products and Completed Operations.
      d. Personal Injury Liability with Employment Exclusion deleted.
      e. Contractual, including specified provisions for Contractor's obligation under Paragraph 3.18.
      f. Owned, non-owned and hired motor vehicles.
      g. Broad Form Property Damage including Completed Operations.

C. Refer to 11.1.1.9
   1. If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

D. Refer to 11.1.2
   1. Add the following paragraph
      a. 11.1.2.1 The Insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:
         1) Workmen's Compensation - Statutory Requirements.
         2) Comprehensive General Liability Insurance shall be maintained with aggregate limit of not less than $2,000,000.00.
         3) Comprehensive Automobile Liability Insurance $500,000.00 combined single limit for both Bodily Injury and Property Damage.
         4) Owner's and Contractor's Protective Liability Insurance shall be maintained with aggregate limit not less than $2,000,000.00, with Architect as additional insured.
      b. 11.1.2.2 Furnish Certificates of Insurance, AIA Documents G705, three copies, showing required insurance is in force before starting contract work. Furnish copies of subsequent endorsements amending coverage or limits.

4.12 ARTICLE 11.3 - PROJECT MANAGEMENT PROTECTIVE LIABILITY INSURANCE

A. Add the following paragraphs:
   1. 11.3.1.2 The General Contractor shall effect and maintain insurance provide in this Article as the interest of the Owner and Contractor may appear. Said insurance in a Company or Companies to which the Owner has no reasonable objection, shall include coverage for damage resulting from vandalism and malicious mischief in the amount of 100%.

4.13 ARTICLE 11.4 - PROPERTY INSURANCE

A. Add the following sentence to paragraph 11.4.1.1.
   1. The form of policy for this coverage shall be Completed Value.

B. Delete paragraph 11.4.1.4, and replace with the following:

1. 11.3.1.4 The Contractor shall provide insurance coverage for portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also for portions of the Work in transit.

4.14 ARTICLE 11.5 - PERFORMANCE BOND AND PAYMENT BOND

A. Delete Subparagraph 11.5.1 and substitute the following:
   1. 11.5.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum.
   2. 11.5.1.1 Failure to deliver bond shall be considered abandonment of the Contract and Bid Security shall be retained as liquidated damages. The bond shall comply with the laws of the State: shall be written by a Surety Company authorized to do business in the State and approved by the Owner. The bond shall be written in favor of the Owner. The contractor shall file the bond with the Circuit Clerk and recorder of the County in which the work is to be performed. The contractor shall provide evidence that the bonds have been filed.
   3. 11.4.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

B. Add the following subparagraph:

4.15 ARTICLE 14.4 - TERMINATION BY THE OWNER FOR CONVENIENCE

A. Revise Subparagraph 14.4.3 as follows:
   1. 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Subparagraph 14.1.2.

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: TRUMANN MS - MIDDLE SCHOOL SYSTEMS REPLACEMENT.

B. Owner's Name: Trumann School District.

C. Architect's Name: Steiling Architecture.

D. Construction Manager's Name: Nabholz Construction Services, Inc.

E. Project Scope of Work:

1. Existing Middle School: (2) sets of large toilets will be demo'd and renovated to a more efficient layout. Existing suspended acoustical ceilings will be demo's throughut the facility for preparation to install new HVAC ductwork and Fire Supression systems. Exisitng light fixtures will be removed, stored, and re-installed with new suspended acoustical grid and tiles. Some new finishes will be installed, new mechanical and electrical systems will be installed, and exterior sanitary sewer, gas lines, and electrical will be replaced.

1.02 CONTRACT DESCRIPTION

Refer to Construction Manager's CM Manual

1.03 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Trumann School District before Substantial Completion. Some items include:

B. Trumann School District will supply the following for installation and / or coordination by the Construction Manager :

1. Toilet Accessories:
   a. Soap Dispensers
   b. Toilet Paper Dispensers
   c. Paper Towel Dispensers

1.04 OWNER OCCUPANCY

A. Trumann School District intends to occupy the Project upon Substantial Completion of the Project.

B. Trumann School District intends to continue to occupy adjacent portions of the existing building during the entire construction period.

C. Trumann School District intends to occupy the Project in phases upon Substantial Completion of those phases.

D. Cooperate with Trumann School District to minimize conflict and to facilitate Trumann School District's daily operations in adjacent areas.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas designated by the Owner for Project construction materials equipment storage and parking.

B. Arrange use of site and premises to allow:

1. Work by Others.
2. Work by Trumann School District.

C. Provide access to and from site as required by law and by Trumann School District:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum.

C. Documentation of changes in Contract Time.

D. Change procedures.

E. Correlation of Contractor submittals based on changes.

F. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Document 00 5200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.

B. Document 00 7200 - General Conditions and Document 00 7300 - Supplementary Conditions: Additional requirements for progress payments, final payment, changes in the Work.

C. Document 00 7300 - Supplementary Conditions: Percentage allowances for Nabholz Construction's overhead and profit.

D. Section 01 2100 - Allowances: Payment procedures relating to allowances.

E. Section 01 2200 - Unit Prices: Monetary values of unit prices, payment and modification procedures relating to unit prices.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Steiling Architecture for approval.

B. Forms filled out by hand will not be accepted.

C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.

F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

G. Include separately from each line item, a direct proportional amount of Nabholz Construction's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Steiling Architecture for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information in typewritten form.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

F. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

J. Submit three copies of each Application for Payment.

K. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 3000.
   2. Construction progress schedule, revised and current as specified in Section 01 3000.
      a. Written request for proposed changes in Contract Time, along with supporting data that would substaniate such request.
   3. Partial release of liens from major Subcontractors and vendors.
   4. Affidavits attesting to off-site stored products.

L. When Steiling Architecture requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Steiling Architecture will issue instructions directly to Nabholz Construction.

B. Steiling Architecture will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. For other required changes, Steiling Architecture will issue a document signed by Trumann School District instructing Nabholz Construction to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Steiling Architecture will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Nabholz Construction shall prepare and submit a fixed price quotation within 5 days.

E. May propose a change by submitting a request for change to Steiling Architecture, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and

a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Steiling Architecture for work falling under a fixed price contract, the amount will be based on Nabholz Construction's price quotation.
   2. For change requested by Nabholz Construction, the amount will be based on the Nabholz Construction's request for a Change Order as approved by Steiling Architecture.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Steiling Architecture without a quotation from Nabholz Construction, the amount will be determined by Steiling Architecture based on the Nabholz Construction's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Steiling Architecture will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2100
ALLOWANCES

PART 1 GENERAL

1.01 REFER TO CONSTRUCTION MANAGER'S BID REQUIREMENTS AND INFORMATION PACKET, AND ANY ISSUED CONTRACT ADDENDUMS, FOR REQUIRED BID PACKAGES CONTINGENCY ALLOWANCES.

1.02 SECTION INCLUDES

A. Contingency allowance.

B. Laundry Equipment.

C. Exterior Building Signage.

D. Payment and modification procedures relating to allowances.

1.03 RELATED REQUIREMENTS

A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.04 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.05 ALLOWANCES SCHEDULE

A. Bidders shall refer to Contract Addendums for any required changes in Bidding Procedures.

B. Nabholz Construction., Construction Manager, shall include in the Stipulated Contract Price the sum of $50,000.00 as a contingency for unforeseen changes in the scope of work. These funds will only be used for approved change orders to the contract. Any monies not designated for approved Change Orders will be deducted from the contract base bid at the completion of the contract.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Steiling Architecture.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

E. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

F. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness, in-place and compacted as a completed unit of work.

G. Measurement by Area: Measured by square dimension using mean length and width or radius.

H. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

I. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

J. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Steiling Architecture prior to starting work.

K. Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.

1.05 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Steiling Architecture, multiplied by the unit price.

B. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.06 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Steiling Architecture, it is not practical to remove and replace the Work, Steiling Architecture will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Steiling Architecture.
   2. The defective Work will be partially repaired to the instructions of the Steiling Architecture, and the unit price will be adjusted to a new unit price at the discretion of Steiling Architecture.

C. If, in the opinion of Trumann School District, it is not practical to remove and replace the Work, Trumann School District will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Trumann School District.
   2. The defective Work will be partially repaired to the instructions of the Trumann School District, and the unit price will be adjusted to a new unit price at the discretion of Trumann School District.

D. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

E. The authority of Trumann School District to assess the defect and identify payment adjustment is final.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic document submittal service.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Construction progress schedule and proposed changes to Contract Time.

F. Coordination drawings.

G. Submittals for review, information, and project closeout.

H. Number of copies of submittals.

I. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Document 00 7200 - General Conditions: Dates for applications for payment.

B. Document 00 7200 - General Conditions: Duties of the Construction Manager.

C. Document 00 7300 - Supplementary Conditions: Duties of the Construction Manager.

D. Section 01 3300 - Weather Delays

E. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

F. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

A. Project Coordinator: Nabhholz Construction Services Inc..

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for construction access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Steiling Architecture through the Project Coordinator:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Nabholz Construction's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Nabholz Construction and Steiling Architecture are required to use this service.
   3. It is Nabholz Construction's responsibility to submit documents in PDF format.
   4. Subcontractors, suppliers, and Steiling Architecture's consultants are to be permitted to use the service at no extra charge.
   5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed.
   7. Emailed PDF documents will not be reviewed unless specifically requested by CahoonSteiling Architecture
   8. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Construction Manager; include the cost of the service in the contract sum.

C. Submittal Service: The selected service is:
   1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.

D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Steiling Architecture and Nabholz Construction participating; further training is the responsibility of the user of the service.

E. Project Closeout: Steiling Architecture will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Trumann School District.

3.02 PRECONSTRUCTION MEETING

A. Project Coordinator will schedule a meeting after Notice of Award.

B. Construction Manager will schedule a meeting after Notice of Award.

C. Attendance Required:
   1. Trumann School District.
   2. Steiling Architecture.
   3. Construction Manager and Project Superintendent.
   4. 1 representative from each bid trade package sub-contractor .

D. Agenda:
   1. Execution of Trumann School District -- Nabholz Construction Services, Inc. Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract, Trumann School District and Steiling Architecture.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

E. Construction Manager to record minutes and distribute copies within two days after meeting to participants, with two copies to Steiling Architecture, Trumann School District, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

A. Construction Manager will schedule a meeting at the Project site prior to Construction Managers's occupancy.

B. Project Coordinator will schedule meeting at the Project site prior to Nabholz Construction occupancy.

C. Attendance Required:
1. Construction Manager.
2. Trumann School District.
3. Steiling Architecture.
4. Project Superintendent.
5. Subcontractors.
6. Others as required by Construction Manager.

D. Agenda:
1. Use of premises by Trumann School District and Construction Manager.
2. Trumann School District's requirements and occupancy prior to completion.
3. Construction facilities and controls provided by Trumann School District.
4. Temporary utilities provided by Trumann School District.
5. Survey and site layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Steiling Architecture, Trumann School District, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Construction Manager, Job superintendent, major Subcontractors, Trumann School District, Steiling Architecture, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.

7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

E. Construction Manager to record minutes and distribute copies within two days after meeting to participants, with two copies to Steiling Architecture, Trumann School District, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major sub-contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.
   1. Proposed changes in Contract Time.
      a. Proposed changes in contract Time are to be submitted in writting monthly.
      b. Fully describing the reasons for the change and effect of the change on the construction schedule, and attach a revised Progress Schedule.
      c. For a change based on weather-related delay, provide and attach weather data from National Oceanic and Atmospheric Administration (NOAA) as an impartial basis for determining justifiable extensions, or daily work logs which describe actual local weather conditions and impact, subject to approval by Designer. Provide and attach NOAA comparative data on normals, means, and extremes in not already provided in Project Manual.
      d. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

F. Submit updated schedule with each Application for Payment.

3.06 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. Review drawings prior to submission to Steiling Architecture.

3.07 SUBMITTALS FOR REVIEW

A. Refer to paragraph 3.01 Electronic Document Submittal Service above.

B. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

C. Submit to Steiling Architecture for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

D. Samples will be reviewed only for aesthetic, color, or finish selection.

E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.08 SUBMITTALS FOR INFORMATION

A. Refer to paragraph 3.01 Electronic Submittal Service above.

B. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

C. Submit for Steiling Architecture's knowledge as contract administrator or for Trumann School District. No action will be taken.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. Refer to paragraph 3.01 Electronic Document Submittal Service above.

D. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

E. Submit for Trumann School District's benefit during and after project completion.

3.10 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Steiling Architecture.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.11 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Refer to paragraph 3.01 Electronic Document Submittal Service above.

D. Transmit each submittal with approved form.

E. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

F. Identify Project, Construction Manager, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

G. Manager's review stamp, dated and signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents, must be affixed to each submittal.

H. Deliver samples and physical submittals to CahoonSteiling | Studio at business address.

I. Schedule submittals to expedite the Project, and coordinate submission of related items.

J. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

K. Provide space for Construction Manager and Steiling Architecture review stamps.

L. When revised for resubmission, identify all changes made since previous submission.

M. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

N. Submittals not requested will not be recognized or processed.

3.12 SUBMITTAL REVIEW

A. Submittals for Review: Steiling Architecture will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Steiling Architecture will acknowledge receipt and review. See below for actions to be taken.

C. Steiling Architecture's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Steiling Architecture's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Nabholz Construction's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:

E. Steiling Architecture's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Nabholz Construction that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Nabholz Construction.

END OF SECTION

SECTION 01 3300
WEATHER DELAYS

PART 1 GENERAL

1.01 EXTENSIONS OF CONTRACT TIME

A. If the basis exists for an extension of time in accordance with paragraph 8.3 of the Conditions, an extension of item on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

1.02 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

A. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined at Standard Baseline of average climatic range for the State of Arkansas.

B. Standard Baseline shall be regarded as the normal and anticipatable number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of adverse weather. SUSPENSION OF CONSTRUCTION ACTIVITY FOR THE NUMBER OF DAYS EACH MONTH AS LISTED IN THE STANDARD BASELINE IS INCLUDED IN THE WORK AND IS NOT ELIGIBLE FOR EXTENSION OF CONTRACT TIME.

C. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	11	8	7	7	6	7	5	4	5	6	11

1.03 ADVERSE WEATHER AND WEATHER DELAY DAYS

A. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:
   1. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure
   2. Temperatures that do not rise above 32 degrees F. by 10:00 a.m.
   3. Temperatures that do not rise above that specified for the days construction activity by 10:00 a.m., if any is specified.
   4. Sustained wind in excess of twenty-five (25) miles per hour.
   5. Standing snow in excess of one inch (1.00")

B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days when all the following conditions are met:
   1. For rain days above the standard baseline.
   2. Only if there is a hindrance to site access to Work, such as excavation, backfill, and footings.
   3. At a rate no greater than 1 make-up day for each day or consecutive rain days beyond the standard baseline that total 1 inch or more, liquid measure, unless specifically recommended otherwise by the Designer.

C. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day, including a weekend day or holiday if Contractor has scheduled construction activity that day.

1.04 DOCUMENTATION AND SUBMITTALS

A. Submit daily jobsite logs showing which and to what extent construction activities have been affected by weather on a monthly basis.

B. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Architect at beginning of project.

C. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.

D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in paragraph 4.3 of the Conditions.

E. If an extension of the Contract Time is appropriate, it shall be effected in accordance with the provisions of Article 7 of the Conditions, and the applicable General Requirements.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Mock-ups.

D. Control of installation.

E. Tolerances.

F. Control of installation.

G. Mock-ups.

H. Tolerances.

I. Manufacturers' field services.

J. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 00 7200 - General Conditions: Inspections and approvals required by public authorities.

B. Section 01 2100 - Allowances: Allowance for payment of testing services.

C. Section 01 3000 - Administrative Requirements: Submittal procedures.

D. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Test Reports: After each test/inspection, promptly submit two copies of report to Steiling Architecture and to the Project Construction Manager.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of inspector.
    d. Date and time of sampling or inspection.
    e. Identification of product and specifications section.
    f. Location in the Project.
    g. Type of test/inspection.
    h. Date of test/inspection.
    i. Results of test/inspection.
    j. Conformance with Contract Documents.
    k. When requested by Steiling Architecture, provide interpretation of results.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Trumann School District will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 01 2100; see Section 01 2100 and applicable sections for description of services included in allowance.

B. Trumann School District will employ and pay for services of an independent testing agency to perform other specified testing.

C. Employment of agency in no way relieves Construction Manager of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Steiling Architecture before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Steiling Architecture and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Steiling Architecture.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Steiling Architecture before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Steiling Architecture and Construction Manager in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.

3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Steiling Architecture and Construction Manager of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Steiling Architecture.
6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Construction Manager.
4. Agency has no authority to stop the Work.

C. Owner's Construction Manager Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Steiling Architecture and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Construction Manager beyond specified requirements.
6. Arrange with Trumann School District's agency and pay for additional samples, tests, and inspections required by Construction Manager beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Steiling Architecture.

E. Re-testing required because of non-conformance to specified requirements shall be paid for by the Contractor or product/services manufacturer.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Steiling Architecture 30 days in advance of required observations.
1. Observer subject to approval of Steiling Architecture.
2. Observer subject to approval of Trumann School District.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Steiling Architecture, it is not practical to remove and replace the Work, Steiling Architecture will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4533
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL - NOT USED

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Document 00 3100 - Available Project Information: Soil investigation data.

B. Document 00 7200 - General Conditions: Inspections and approvals required by public authorities.

1.03 DEFINITIONS

A. Code or Building Code: 2012 Edition Arkansas Fire Prevention Code, (based on 2012 International Building Code) and, more specifically, Chapter 17 - Structural Tests and Inspections, of same.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Trumann School District or Nabholz Construction for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

C. AISC 341 - Seismic Provisions for Structural Steel Buildings; 2010.

D. AISC 360 - Specification for Structural Steel Buildings; 2010.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2012.

G. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2010.

H. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

I. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

J. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

K. AWCI 117 - Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide; 2014.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

M. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

N. IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2012.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Smoke Control Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:
   1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit documentary evidence that agency has appropriate credentials and documented experience in fire protection engineering, mechanical engineering and HVAC air balancing.
   3. Submit certification that Testing Agency is acceptable to AHJ.

D. Manufacturer's Qualification Statement: Manufacturer shall submit documentation of manufacturing capability and quality control procedures.

E. Fabricator's Qualification Statement: Fabricator shall submit documentation of fabrication facilities and methods as well as quality control procedures.

F. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Steiling Architecture and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Conformance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

G. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector shall promptly submit two copies of report; one to Steiling Architecture and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.

e. Identification of fabricated item and specification section.
f. Location in the Project.
g. Results of special inspection.
h. Verification of fabrication and quality control procedures.
i. Conformance with Contract Documents.
j. Conformance to referenced standard(s).

H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Steiling Architecture and AHJ, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Steiling Architecture and AHJ.

I. Manufacturer's Field Reports: Submit reports to Steiling Architecture and AHJ.
1. Submit report in duplicate within 30 days of observation to Steiling Architecture for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

J. Fabricator's Field Reports: Submit reports to Steiling Architecture and AHJ.
1. Submit report in duplicate within 30 days of observation to Steiling Architecture for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.06 SPECIAL INSPECTION AGENCY

A. Nabholz Construction will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Nabholz Construction of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
1. Independent firm specializing in performing testing and inspections of the type specified in this section.
2. Accredited by IAS according to IAS AC291.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. High-Strength Bolt, Nut and Washer Material:

1. Verify identification markings conform to ASTM standards specified in the approved contract and to AISC 360, A3.3; periodic.
2. Submit manufacturer's certificates of compliance; periodic.

B. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
1. Snug tight joints; periodic.

C. Structural Steel and Cold Formed Steel Deck Material:
1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
3. Submit manufacturer's certificates of compliance and test reports; periodic.

D. Weld Filler Material:
1. Verify identification markings conform to AWS standards specified in the approved contract documents and to AISC 360, A3.5; periodic.
2. Submit manufacturer's certificates of compliance; periodic.

E. Welding:
1. Reinforcing Steel: Verify items listed below comply with AWS D1.4 and ACI 318, Section 3.5.2.
a. Verification of weldability; periodic.
b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
c. Shear reinforcement; continuous.
d. Other reinforcing steel; periodic.

F. Steel Frame Joint Details: Verify compliance with approved contract documents.
1. Details, bracing and stiffening; periodic.
2. Member locations; periodic.
3. Application of joint details at each connection; periodic.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved contract documents and ACI 318, 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4 and ACI 318, 3.5.2; periodic.

C. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved contract documents and ACI 318, 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.

D. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318, 3.8.6, 8.1.3 and 21.2.8; periodic.

E. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.

F. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172, ASTM C31 and ACI 318, 5.6 and 5.8 and record the following, continuous:
1. Slump.
2. Air content.
3. Temperature of concrete.

G. Concrete and Shotcrete Placement: Verify application techniques comply with approved contract documents and ACI 318, 5.9 and 5.10; continuous.

H. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, 5.11 through 5.13; periodic.

I. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, 6.2, for the following.

J. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, 6.1.1; periodic.

K. Materials: If the Nabholz Construction cannot provide sufficient data or documentary evidence that concrete materials conform to the quality standards of ACI 318, the AHJ will require that the Special Inspector verify compliance with the appropriate standards and criteria in ACI 318, Chapter 3.

3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

A. Masonry Structures Subject to Special Inspection:
   1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
   2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".

B. Verify each item below complies with approved contract documents and the applicable articles of TMS 402/602.
   1. Inspections and Approvals:
      a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.
      b. Verify approval of submittals required by contract documents; periodic.
   2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
   3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
   4. Joints and Accessories: When masonry construction begins, verify:
      a. Proportions of site prepared mortar; periodic.
      b. Construction of mortar joints; periodic.
      c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc.; periodic.
   5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
      a. Size and location of structural elements; periodic.
      b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
      c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
      d. Welding of reinforcing bars; continuous.

C. Engineered Masonry in Buildings Designated as "Essential Facilities": Verify compliance of each item below with approved contract documents and the applicable articles of ACI 530/ASCE 5/TMS 402.
   1. Inspections and Approvals:
      a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.
      b. Verify approval of submittals required by contract documents; periodic.
   2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction and upon completion of each 5,000 square feet increment of masonry erected during construction; periodic.
   3. Preblended Mortar and Grout: Verify proportions of materials upon delivery to site; periodic.
   4. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.

5. Engineered Elements, Joints, Anchors, Grouting, Protection: Verify compliance of each item below with approved contract documents and referenced standards.
    a. Proportions of site prepared mortar; periodic.
    b. Placement of masonry units and construction of mortar joints; periodic.
    c. Placement of reinforcement, connectors, prestressing tendons, anchorages, etc.; periodic.
    d. Size and location of structural elements; periodic.
    e. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; continuous.
    f. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
    g. Welding of reinforcing bars; continuous.
6. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; continuous.

3.05 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
    1. Design bearing capacity of material below shallow foundations; periodic.
    2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
    3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
    4. Subgrade, prior to placement of compacted fill; periodic.

B. Testing: Classify and test excavated material; periodic.

3.06 SPECIAL INSPECTIONS FOR SMOKE CONTROL

A. Test smoke control systems as follows:
    1. Record device locations and test system for leakage after erection of ductwork but before starting construction that conceals or blocks access to system.
    2. Test and record pressure difference, flow measurements, detection function and controls after system is complete and before structure is occupied.

3.07 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. Structural Steel: Comply with the quality assurance plan requirements of AISC 341.

B. Cold Formed Steel Light Frame Construction:
    1. Field welding; periodic.
    2. Screw attachment, bolting, anchoring and other fastening of components within the main seismic force-resisting system; periodic.

C. Architectural Components: Erection and fastening of components below; periodic.
    1. Exterior cladding.
    2. Interior and exterior veneer.
    3. Interior and exterior non-loadbearing walls and partitions.

D. Mechanical and Electrical Components:
    1. Anchorage of electric equipment required for emergency or standby power systems; periodic.
    2. Installation and anchorage of other electrical equipment; periodic.
    3. Vibration isolation systems where the approved contract documents require a nominal clearance of 1/4 inch or less between support frame and seismic restraint; periodic.

E. Designated Seismic System Verification: Verify label, anchorage or mounting conforms to certificate of compliance provided by manufacturer or fabricator.

F. Seismic Isolation System:
    1. Fabrication and installation of isolator units; periodic.
    2. Fabrication and isolation of energy dissipation devices; periodic.

G. Structural Testing for Seismic Resistance:
   1. Concrete reinforcement: Comply with ACI 318, Section 21.1.5.2.
      a. Materials Obtain mill certificates demonstrating compliance with ASTM A615/A615M; periodic.
      b. Welding: Perform chemical tests complying with ACI 318, Section 3.5.2 to determine weldability; periodic.
   2. Structural Steel: Comply with the quality assurance requirements of AISC 341.
   3. Non-Structural Components:
      a. General Design Requirements: Obtain manufacturer certification of compliance with requirements of ASCE 7, Section 13.2.1; periodic.
      b. Designated Seismic Force-Resisting Non-Structural System Components: Obtain manufacturer certification of compliance with ASCE 7, Section 13.2.2; periodic.

H. Structural Observations for Seismic Resistance: Visually observe structural system for general conformance with the approved contract documents; periodic.

3.08 OTHER SPECIAL INSPECTIONS

A. Provide for special inspection of work that, in the opinion of the AHJ, is unusual in nature.

B. For the purposes of this section, work unusual in nature includes, but is not limited to:
   1. Construction materials and systems that are alternatives to materials and systems prescribed by the building code.
   2. Unusual design applications of materials described in the building code.
   3. Materials and systems required to be installed in accordance with the manufacturer's instructions when said instructions prescribe requirements not included in the building code or in standards referenced by the building code.

C. Alternative Test Procedures: Where approved rules and standards do not exist, test materials and assemblies as required by AHJ or provide AHJ with documentation of quality and manner in which those materials and assemblies are used.

D. Load Tests:
   1. Proposed Construction and Construction in Progress: Where required by code, conduct tests listed below.
      a. Load test procedures specified in code; periodic.
      b. Loadbearing Wall and Partition Assemblies: Load test with and without window framing; periodic.
      c. Exterior Window and Door Assemblies: Wind load design pressure test; periodic.
   2. Completed Construction: Where required by code, conduct tests listed below.
      a. Load test procedures specified in code; periodic.

3.09 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Verify samples submitted by Nabholz Construction comply with the referenced standards and the approved contract documents.
   2. Provide qualified personnel at site. Cooperate with Steiling Architecture and Nabholz Construction in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified reference standards.
   4. Ascertain compliance of materials and products with requirements of Contract Documents.
   5. Promptly notify Steiling Architecture and Nabholz Construction of observed irregularities or non-conformance of work or products.
   6. Perform additional tests and inspections required by Steiling Architecture.
   7. Attend preconstruction meetings and progress meetings.
   8. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Nabholz Construction.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Steiling Architecture.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Nabholz Construction.

3.10 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Steiling Architecture and Nabholz Construction in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Steiling Architecture and Nabholz Construction of observed irregularities or non-conformance of work or products.
5. Perform additional tests and inspections required by Steiling Architecture.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Nabholz Construction.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Steiling Architecture.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Nabholz Construction.

3.11 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Nabholz Construction Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to work to be tested or inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
   c. To facilitate tests or inspections.
   d. To provide storage and curing of test samples.
4. Notify Steiling Architecture and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Trumann School District's agency and pay for additional samples, tests, and inspections required by Nabholz Construction beyond specified requirements.

B. Nabholz Construction Responsibilities, Wind Force-Resisting Systems: Submit written statement of responsibility for each item listed to AHJ and Trumann School District prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.12 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Steiling Architecture 30 days in advance of required observations.
   1. Observer subject to approval of Steiling Architecture.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.13 SCHEDULE OF SPECIAL INSPECTIONS - GENERAL

A. **Contractor shall obtain (download) copy of Structural Engineers Association of Arkansas document titled "Arkansas Special Inspections Guidelines" dated January 01, 2014 for comprehensive special inspections instructions and requirements, and contract forms required for documentation. (Document: SEAoAR SI GL 02 - 01/01/2014)**

B. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.14 SCHEDULE OF SPECIAL INSPECTIONS - SPECIFIC

A. **1704.2.5 Inspection of Fabricators**
   1. Verify fabrication/quality control procedures.
      a. Service: In-plant review (3)
         1) *(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)*
      b. Extent: Periodic
      c. Agent: Special Inspections Agency

B. **1705.2 Structural Steel Construction**
   1. (1) Review the material test reports and certificates as listed in AISC 360-10, Section N3.2 for compliance with the construction documents.
      a. Service: Submittal review
      b. Extent: Each submittal
      c. Agent: Special Inspections Agency
   2. (2) Material verification of structural steel
      a. Service: Shop (3) and field inspection
         1) *(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)*
      b. Extent: Periodic
      c. Agent: Special Inspections Agency
   3. (3) Anchor Rods and other Embedment(s) (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)
      a. Service: Field inspection
      b. Extent: Continuous
      c. Agent: Special Inspections Agency
   4. (4) Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents.
      a. Service: Field inspection

b. Extent: Periodic
c. Agent: Special Inspections Agency

5. (5) Structural steel welding:
   a. (5a) Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)
      1) Service: Shop (3) and field inspection
         (a) *(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)*
      2) Extent: Observe or Perform as noted (4)
         (a) *(4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.*
      3) Agent: Special Inspections Agency
   b. (5b) Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2)
      1) Service: Shop (3) and field inspection
         (a) (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
      2) Extent: Observe (4)
         (a) (4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.
      3) Agent: Special Inspections Agency
   c. (5c) Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3)
      1) Service: Shop (3) and field inspection
         (a) (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
      2) Extent: Observe or Perform as noted (4)
         (a) (4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.
      3) Agent: Special Inspections Agency
   d. (5d) Nondestructive testing (NDT) of welded joints: See Commentary
      1) (5d)(1) Complete penetration groove welds at joints in materials 5/16" or greater in Risk Category III or IV.
         (a) Service: Shop (3) or field ultrasonic testing - 100%
             (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
         (b) Extent: Periodic
         (c) Agent: Special Inspections Agency
      2) (5d)(2) Complete penetration groove welds at joints in materials 5/16" or greater in Risk Category II
         (a) Service: Shop (3) or field ultrasonic testing - 10% of welds minimum
             (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
         (b) Extent: Periodic
         (c) Agent: Special Inspections Agency
      3) (5d)(3) Thermally cut surfaces of access holes when material t > 2"

(a) Service: Shop (3) or field magnetic Particle or Penetrant testing

(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)

(b) Extent: Periodic

(c) Agent: Special Inspections Agency

4) (5d)(4) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1

(a) Service: Shop (3) or field radiographic or Ultrasonic testing

(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)

(b) Extent: Periodic

(c) Agent: Special Inspections Agency

5) (5d)(5) Fabricator's NDT reports when fabricator performs NDT

(a) Service: Verify reports

(b) Extent: Each Submittal (5)

(5) NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N7.

(c) Agent: Structural Engineer

6. 6. Structural steel bolting:

a. Service: Shop (3) and field inspection

(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)

b. Extent: n/a

c. Agent: Structural Engineer

1) (6a) Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360-10, Table N5.6-1)

(a) Service: n/a

(b) Extent: Observe or Perform as noted (4)

(4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.

(c) Agent: Structural Engineer

d. (6b) Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360-10, Table N5.6-2)

1) Service: n/a

2) Extent: Observe (4)

(4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.

3) Agent: Structural Engineer

4) (6b)(1) Pre-tensioned and slip-critical joints

(6b)(1)(a) Turn-of-nut with matching markings

(1) Service: n/a

(2) Extent: Periodic

(3) Agent: Structural Engineer

(a) (6b)(1)(b) Direct tension indicator

(1) Service: n/a

(2) Extent: Periodic

(3) Agent: Structural Engineer

(b) (6b)(1)(c) Twist-off type tension control bolt

(1) Service: n/a
(2) Extent: Periodic
(3) Agent: Structural Engineer

(c) (6b)(1)(d) Turn-of-nut without matching markings
(1) Service: n/a
(2) Extent: Continuous
(3) Agent: Structural Engineer

(d) (6b)(1)(e) Calibrated wrench
(1) Service: n/a
(2) Extent: Continuous
(3) Agent: Structural Engineer

(e) (6b)(2) Snug-tight joints
(1) Service: n/a
(2) Extent: Periodic
(3) Agent: Structural Engineer

(f) (6c) Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)
(1) Service: n/a
(2) Extent: Perform (4)
(3) *(4) Observe on a random basis, operations need not be delayed pending these inspections. Perform these tasks for each welded joint, bolted connection, or steel element.*
(4) Agent: Structural Engineer

C. **1705.3 Concrete Construction**

1. (1) Inspection of reinforcing steel placement
   a. Service: Field inspection
   b. Extent: Periodic
   c. Agent: Special Inspections Agency
2. (3) Inspection of anchors cast in concrete where allowable loads have been increased or where strength design is used
   a. Service: Shop (3) and field inspection
      (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
   b. Extent: Continuous
   c. Agent: Special Inspections Agency
3. (5) Verify use of approved design mix
   a. Service: Shop (3) and field inspection
      (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
   b. Extent: Periodic
   c. Agent: Structural Engineer, Structural Engineer and Manufacturer
4. (6) Fresh concrete sampling, perform slump and air content tests and determine temperature of concrete
   a. Service: Shop (3) and field inspection
      (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
   b. Extent: Continuous
   c. Agent: Special Inspections Agency and Manufacturer
5. (8) Inspection for maintenance of specified curing temperature and techniques
   a. Service: Shop (3) and field inspection
      (3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
   b. Extent: Periodic

c. Agent: Special Inspections Agency

6. (13) Concrete strength testing and verification of compliance with construction documents
   a. Service: Field testing and review of laboratory reports
   b. Extent: Periodic
   c. Agent: Special Inspections Agency

D. **1705.4 Masonry Construction**

1. **(A) Level A, B and C Quality Assurance:**
   a. (1) Verify compliance with approved submittals
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Structural Engineer
2. **(B) Level B Quality Assurance:**
   a. (1) Verification of f'm and f'AAC prior to construction
      1) Service: Testing by unit strength method or prism test method
      2) Extent: Periodic
      3) Agent: Structural Engineer
3. **(D) Levels B and C Quality Assurance:**
   a. (1) Verification of Slump Flow and Visual Stability Index (VSI) of selfconsolidating grout as delivered to the project
      1) Service: Field testing
      2) Extent: Continuous
      3) Agent: Special Inspections Agency
   b. (2) Verify compliance with approved submittals
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Structural Engineer
   c. (3) Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Structural Engineer
   d. (4) Verify grade, type, and size of reinforcement and anchor bolts, and prestressing tendons and anchorages
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Structural Engineer
   e. (5) Verify construction of mortar joints
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Structural Engineer
   f. (6) Verify placement of reinforcement, connectors, and prestressing tendons and anchorages
      1) Service: Field inspection
      2) Extent: Level B - Periodic
      3) Agent: Structural Engineer
   g. (7) Verify grout space prior to grouting
      1) Service: Field inspection
      2) Extent: Level B - Periodic
      3) Agent: Structural Engineer
   h. (8) Verify placement of grout and prestressing grout for bonded tendons
      1) Service: Field inspection
      2) Extent: Continuous

3) Agent: Special Inspections Agency

i. (9) Verify size and location of structural masonry elements
   1) Service: Field inspection
   2) Extent: Periodic
   3) Agent: Structural Engineer

j. (10) Verify type, size, and location of anchors, including details of anchorage of masonry to structural members, frames, or other construction.
   1) Service: Field inspection
   2) Extent: Level B - Periodic
   3) Agent: Structural Engineer

k. (12) Verify preparation, construction, and protection of masonry during cold weather (temperature below 40° F) or hot weather (temperature above 90° F)
   1) Service: Field inspection
   2) Extent: Periodic
   3) Agent: Structural Engineer

   (18) Prepare grout and mortar specimens
   1) Service: Field testing
   2) Extent: Level B - Periodic
   3) Agent: Structural Engineer

   (19) Observe preparation of prisms
   1) Service: Field inspection
   2) Extent: Level B - Periodic
   3) Agent: Structural Engineer

E. **1705.6 Soils**

1. (1) Verify materials below shallow foundations are adequate to achieve the design bearing capacity.
   a. Service: Field inspection
   b. Extent: Periodic
   c. Agent: Special Inspections Agency
2. (2) Verify excavations are extended to proper depth and have reached proper material.
   a. Service: Field inspection
   b. Extent: Periodic
   c. Agent: Special Inspections Agency
3. (3) Perform classification and testing of controlled fill materials.
   a. Service: Field inspection
   b. Extent: Periodic
   c. Agent: Special Inspections Agency
4. (4) Verify use of proper materials, densities, and lift thicknesses during placement and compaction of compacted fill
   a. Service: Field inspection
   b. Extent: Continuous
   c. Agent: Special Inspections Agency
5. (5) Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly
   a. Service: Field inspection
   b. Extent: Periodic
   c. Agent: Special Inspections Agency

F. **1705.11.4 Designated Seismic System Verification**

1. Inspect and verify that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with 1705.12.3
   a. Service: Field inspection
   b. Extent: Continuous

c. Agent: Special Inspections Agency

2. (1) Architectural Designated Seismic Systems (per ASCE 7-10)
   a. (1a) Interior non-structural partition walls and connections
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Architect
   b. (1f) Suspended Ceiling Systems
      1) Service: Field inspection
      2) Extent: Periodic
      3) Agent: Architect
3. (2) Mechanical & Electical Designated Seismic Systems (per ASCE 7-10)
   a. (2a) Mechanical and Electrical Components
      1) (2a)(1) Air-side HVAC fans, air handlers, air conditioning units, air distribution boxes, and other mechanical components constructed of sheet metal
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Mechanical Engineer
      2) (2a)(3) Engines, turbines, pumps, compressors, and pressure vessels
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Mechanical Engineer
      3) (2a)(6) Motor control centers, panel boards, switch gear, instrumentation cabinets, and other components constructed of sheet metal framing
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Electrical Engineer
      4) (2a)(7) Communication equipment, computers, instrumentation and controls
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Electrical Engineer
      5) (2a)(9) Light fixtures
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Electrical Engineer
   b. (2b) Vibration Isolated Components & Systems
      1) (2b)(1) Components and systems isolated using neoprene elements and neoprene isolated floors with built-in or separate elastomeric snubbing devices or resilient perimeter stops
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Mechanical Engineer
      2) (2b)(2) Spring isolated components and systems closely restrained using built in or separate elastomeric snubbing devices or resilient perimeter stops
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Mechanical Engineer
      3) (2b)(3) Internally isolated systems and supports
         (a) Service: Field inspection
         (b) Extent: Periodic
         (c) Agent: Mechanical Engineer
      4) (2b)(4) Suspended vibration isolation equipment including in-line duct devices and suspended internally isolated components
         (a) Service: Field inspection

(b) Extent: Periodic
(c) Agent: Mechanical Engineer

c. (2c) Distribution Systems
1) (2c)(1) Piping and tubing including in-line components
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Mechanical Engineer
2) (2c)(2) Ductwork, including in–line components
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Mechanical Engineer
3) (2c)(3) Electrical conduit and cable trays
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Electrical Engineer
4) (2c)(4) Bus ducts
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Electrical Engineer
5) (2c)(5) Plumbing
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Mechanical Engineer
6) (2c)(7) Fire Protection Sprinkler Pipe System
(a) Service: Field inspection
(b) Extent: Periodic
(c) Agent: Mechanical Engineer

G. **1705.11.6 Mechanical and Electrical Components Special Inspections for Seismic Resistance**
1. (1) Inspection during the anchorage of electrical equipment for emergency or standby power systems.
a. Service: Field inspection
b. Extent: Periodic
c. Agent: Electrical Engineer
2. (2) Inspection during the anchorage of other electrical equipment.
a. Service: Field inspection
b. Extent: Periodic
c. Agent: Electrical Engineer
3. (5) Inspection during the installation and anchorage of vibration isolation systems.
a. Service: Field inspection
b. Extent: Periodic
c. Agent: Mechanical Engineer

H. **1705.12.2 Structural Steel Testing and Qualification for Seismic Resistance**
1. Test in accordance with the quality assurance requirements of AISC 341-10
a. Service: Shop (3) and field testing
(3) Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2)
b. Extent: Per AISC 341
c. Agent: Special Inspections Agency

I. **1705.16 Fire-Resistant Penetrations and Joints**
1. (1) Inspect penetration firestop
a. Service: Field testing

b. Extent: Per ASTM E 2174
c. Agent: Special Inspections Agency

2. (2) Inspect fire-resistant joint systems
   a. Service: Field testing
   b. Extent: Per ASTM E 2393
   c. Agent: Special Inspections Agency

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

THIS SECTION IS FOR INFORMATION ONLY AND APPLIES TO CONSTRUCTION MANAGER ONLY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 01 5813 - Temporary Project Signage.

1.03 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

B. Existing facilities may not be used.

C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Provide, maintain, and pay for cellular telephone service for the project superintendent.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

C. At end of construction, return facilities to same or better condition as originally found.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 FENCING

A. Construction: Nabholz Construction's option.

B. Provide safety fence around construction site; equip with vehicular and pedestrian gates with locks.

1.08 SECURITY

A. Provide security and facilities to protect Work, and Trumann School District's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Trumann School District's security program.

1.09 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Trumann School District.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Designated existing on-site roads may be used for construction traffic.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

F. Do not allow vehicle parking on existing pavement except where designated by Trumann School District

1.10 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically, and when specifically requested to do so by CahoonSteiling | Studio or Trumann School District

C. Clean up debris, waste, paper wrappings and trash daily. Site and accessory parking and material storage areas must be kept clean and orderly at all times.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 PROJECT SIGNS - SEE SECTION 01 5813

1.12 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 8 persons.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5710
EXCAVATION SAFETY PROCEDURES

PART 1 GENERAL

1.01 SCOPE

A. In accordance with Arkansas Code Annotated 22-9-212, the contractor shall include a separate pay item for trench or excavatioin safety systems for any trench or excavation which equals or exceeds five (5) feet in depth and this pay item shall be a part of the contract price.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials used must meet OSHA regulations

PART 3 EXECUTION

3.01 METHODOLOGY

A. It is the contractor's responsibility to comply with regulations for excavation safety systems.

B. The Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System 29 CFR 1926, Subpart P is hereby incorporated into this Project Manual following tis section.

END OF SECTION

SECTION 01 5813
TEMPORARY PROJECT SIGNAGE

THIS SECTION IS FOR INFORMATION ONLY AND APPLIES TO CONSTRUCTION MANAGER ONLY

PART 1 GENERAL

4.01 SECTION INCLUDES

A. Project identification sign.

4.02 QUALITY ASSURANCE

A. Design sign and structure to withstand 70 miles/hr wind velocity.

B. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

PART 2 PRODUCTS

5.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surface: Single sided, 96 inch. x 96 inch., 10 mil (1/2") coroplast face with surface applied vinyl lettering and graphics.

C. Rough Hardware: Galvanized.

D. Lettering: Pre-cut vinyl self-adhesive products, design and colors as directed by architect.

5.02 PROJECT IDENTIFICATION SIGN

A. One painted sign, 64 sq ft area, bottom 6 feet above ground.

B. Graphic Design, Colors, Style of Lettering: Designated by Steiling Architecture.

PART 3 EXECUTION

6.01 INSTALLATION

A. Install project identification sign within 15 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

6.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

6.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Document 00 2113 - Instructions to Bidders: Product options and substitution procedures prior to bid date.

B. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Trumann School District; notify Trumann School District promptly upon discovery; protect, remove, handle, and store as directed by Trumann School District.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Trumann School District, or otherwise indicated as to remain the property of the Trumann School District, become the property of the Nabholz Construction; remove from site.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Where all other criteria are met, Nabholz Construction shall give preference to products that:

1. Are extracted, harvested, and/or manufactured closer to the location of the project.
2. Have longer documented life span under normal use.
3. Result in less construction waste.
4. Are made of vegetable materials that are rapidly renewable.
5. Are made of recycled materials.
6. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.

7. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
8. Are Cradle-to-Cradle Certified.
9. Have a published GreenScreen Chemical Hazard Analysis.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period and the documents required. Comply with requirements specified in Section 00 2113.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Trumann School District.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Agrees to reimburse Trumann School District and Steiling Architecture for review or redesign services associated with re-approval by authorities.

D. Substitution Submittal Procedure (after contract award):
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Steiling Architecture will notify Nabholz Construction in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Demonstration and instruction of Trumann School District personnel.

G. Closeout procedures, including Nabholz Construction's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Trumann School District or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Alternatives to cutting and patching.
      f. Effect on work of Trumann School District or separate Contractor.
      g. Written permission of affected separate Contractor.
      h. Date and time work will be executed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

A. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in Arkansas.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. See Section 01 1000 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Trumann School District occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Trumann School District's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Steiling Architecture four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Steiling Architecture, Trumann School District, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Steiling Architecture before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. See Section 01 1000 for other limitations on outages and required notifications.
      c. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.

7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-conforming work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

J. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Nabholz Construction personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Division 23 and Section 014000.

3.12 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Trumann School District prior to final completion before Trumann School District occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Replace filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Steiling Architecture and Trumann School District.

B. Notify Steiling Architecture when work is considered ready for Steiling Architecture's Substantial Completion inspection.

C. Submit written certification containing Nabholz Construction's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Steiling Architecture's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Steiling Architecture's and Nabholz Construction's comprehensive list of items identified to be completed or corrected and submit to Steiling Architecture.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Trumann School District-occupied areas.

F. Notify Steiling Architecture when work is considered finally complete and ready for Steiling Architecture's Substantial Completion final inspection.

G. Complete items of work determined by Steiling Architecture listed in executed Certificate of Substantial Completion.

3.14 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Furnish service and maintenance of components indicated in specification sections during the warranty period.

D. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

E. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

F. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Trumann School District.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Steiling Architecture with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Steiling Architecture will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Trumann School District, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Steiling Architecture comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Trumann School District's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Trumann School District.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.

3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Trumann School District's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Steiling Architecture, Consultants, Nabholz Construction and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Steiling Architecture, Construction Manager, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties and bonds.

N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

O. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Steiling Architecture , Consultants, and Nabholz Construction with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Trumann School District's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

C. Abandonment and removal of existing utilities and utility structures.

D. Abandonment or relocation of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Nabholz Construction's use of site and premises.

B. Section 01 1000 - Summary: Sequencing and staging requirements.

C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 5713 - Temp. Erosion / Sedimentation Control.

E. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

F. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

G. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Remove designated portions of the existing building, as described on the Demolition Drawings.

B. Remove concrete slabs on grade as indicated on drawings as directed by Owner and/or Architect.

C. Remove underground utilities and piping.

D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

E. Prepare areas where concrete slabs were removed to receive new concrete slab infill.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 7000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Use of explosives is not permitted.
3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
4. Provide, erect, and maintain temporary barriers and security devices.
5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
7. Do not close or obstruct roadways or sidewalks without permission.
8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Trumann School District or CahoonSteiling Architecture.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Steiling Architecture and Trumann School District; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Partial Removal of Floor Slab areas, Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Trumann School District.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Trumann School District.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.
2. Report discrepancies to Steiling Architecture before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

C. Remove existing work as indicated and as required to accomplish new work.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. See Section 01 1000 for other limitations on outages and required notifications.
4. Verify that abandoned services serve only abandoned facilities before removal.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 0516
UNDERSLAB VAPOR BARRIER - STEGO

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under all concrete slabs on grade, including interior building where existing concrete slab sections are being removed and re-installed.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 03 3000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Samples: Submit samples of underslab vapor barrier to be used.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Thickness: 15 mils.
   3. Basis of Design:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

SECTION 03 1000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Blockouts for in-floor volleyball sleeves.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ASME A17.1 - Safety Code for Elevators and Escalators; 2013.

1.04 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for design, fabrication, erection and removal of formwork.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

2.02 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor with the approval of the Architect.

2.03 REMOVABLE PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage, 0.0598 inch thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

2.04 FORMWORK ACCESSORIES

A. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.05 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.06 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

C. Camber slabs and beams in accordance with ACI 301.

3.07 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.08 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 04 0800 - Seismic Rated Masonry Reinforcement.

C. Section 04 2900 - Engineered Unit Masonry: Reinforcement for engineered masonry.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

B. ACI SP-66 - ACI Detailing Manual; 2004.

C. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.

D. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

H. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

I. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

J. CRSI (DA4) - Manual of Standard Practice; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed to practice in Arkansas.
   2. Refer to drawings for structural notes by structural engineer for additionial information concerning submittals.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. STRUCTURAL DRAWINGS, NOTES AND DETAILS TAKE PRECEDENCE OVER THE FOLLOWING IN CASE OF DISCREPANCIES:

B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) minimum.
   1. Deformed billet-steel bars.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
   1. Flat Sheets only.
   2. WWR Style: 4 x 8-W6 x W10.

D. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Refer to drawings for structural notes by structural engineer for additional information concerning reinforcement accessories.

2.02 RE-BAR SPLICING:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
   1. Products:
      a. Dayton Superior Corporation; Bar Lock Coupler System: www.daytonsuperior.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is permitted only with the specific approval of Steiling Architecture. Perform welding in accordance with AWS D1.4/D1.4M.
   1. Galvanized Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).

C. Refer to drawings for structural notes by structural engineer for additional information concrete reinforcement fabrication, lap splices, etc.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as per structural notes by structural engineer.

E. Conform to applicable code for concrete cover over reinforcement.

3.02 SCHEDULES

A. Reinforcement For Superstructure Framing Members: Deformed bars, unfinished.

B. Reinforcement For Foundation Wall Framing Members and Slab-on-Grade: Deformed bars and welded wire reinforcement, galvanized finish.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Floors and slabs on grade.

B. Concrete foundations and anchor bolts for structural steel.

C. Joint devices associated with concrete work.

D. Miscellaneous concrete elements, including equipment pads and manholes.

E. Concrete moisture vapor emissions and pH testing. Refer to paragraph 2.04.B this section.

F. Provide vapor reducing admixtures at areas to receive fluid-applied athletic flooring.

G. Concrete curing

H. Required flatness tolerances

1.02 RELATED REQUIREMENTS

A. Section 03 0505 - Underslab Vapor Barrier

B. Section 01 4000 - Quality Requirements: Concrete Testing

C. Section 32 1313 - Concrete Paving: Exterior walks, pads and paving.

D. Section 03 2000 - Concrete Reinforcing.

E. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

F. Section 07 9513 - Expansion Joint Cover Assemblies.

G. Section 31 3116 - Termite Control: Field-applied termiticide and mildewcide for concrete surfaces.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

E. ACI 305R - Hot Weather Concreting; 2010.

F. ACI 306R - Cold Weather Concreting; 2010.

G. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

I. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

L. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

O. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.

P. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

Q. COE CRD-C 513 - COE Specifications for Rubber Waterstops; 1974.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Test Reports: Submit report for each test or series of tests specified.

F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Nabholz ConstructionContractors's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03 2000.

B. Refer to structural drawings for notes and details by structural engineer regarding Reinforcement for structural reinforced concrete.

2.03 CONCRETE MATERIALS

A. Refer to structural drawings for notes and details by structural engineer regarding Concrete Materials.

B. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Refer to structural drawings for notes and details by structural engineer regarding Admixtures.

2.05 ACCESSORY MATERIALS

A. Refer to structural drawings for notes and details by structural engineer regarding Concrete Accessories.

B. Comply with requirements of Section 03 0505 Underslab Vapor Barrier.

C. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

D. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.

E. Moisture-Retaining Cover: ASTM C 171; regular curing paper, white curing paper, clear polyethylene, white polyethylene, or white burlap-polyethylene sheet.

2.06 BONDING AND JOINTING PRODUCTS

A. Waterstops: Rubber, complying with COE CRD-C 513.

B. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.

C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

D. Refer to structural drawings for notes and details by structural engineer regarding Joint Devices and Materials.

E. Waterstops: Rubber type, COE CRD-C 513. When required, Provide Greenstreak, ribbed with centerbulb, product no. 732 manufactured by Atlas Construction Specialties, Inc.: www.atlasconstructionspecialties.com.

F. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/2 inch thick and 4 inches deep; tongue and groove profile.

G. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

2.07 CURING MATERIALS

A. Curing and Sealing Compound: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
   1. Vehicle: Water-based.
   2. Solids by Mass: 20 percent, minimum.
   3. VOC Content: OTC compliant.
   4. Products:
      a. BASF:: Sonneborn: KURE-N-SEAL(TM)-WB: BuildingSystems.BASF.com
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
   3. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide.

C. Polyethylene Film: ASTM D2103, 4 mil thick, clear.

D. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Refer to structural drawings for notes and details by structural engineer regarding Concrete Mix Designs.

B. Submit proposed Concrete Mix Designs for approval prior to beginning of concrete work.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

2.09 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

1. Each load of concrete shall be accompanied by the batch plant ticket recording the total water content (gallons per yard) in the initial mix, and the maximum water (gallons per yard) that may be added at the site before exceeding design ratio. Tickets are to be kept on site by the project superintendent
2. If water is added to the mix, spin drum a minimum of thirty complete revolutions before discharging concrete. Measure slump after each time water is added. Record all water added along with the volume of concrete in the truck.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. At fluid-applied athletic flooring areas:

1. The contractor shall furnish and install the concrete subfloors, depressing the slab sufficiently to accommodate the floor system.

2. The slab shall be steel troweled and finished smooth to a tolerance of 1/8" in any 10' radius. Floor flatness and floor levelness (FF and FL) numbers are not recognized. High spots shall be ground level and low spots filled with approved leveling compound.
3. No concrete curing, hardening or sealing agents shall be applied or mixed with the concrete subfloor.

B. Place concrete in accordance with ACI 304R.

C. Place concrete for floor slabs in accordance with ACI 302.1R.

D. Notify Steiling Architecture not less than 24 hours prior to commencement of placement operations.

E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on the drawings or notes.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

E. Separate slabs on grade from vertical surfaces with joint filler.

F. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Install joint devices in accordance with manufacturer's instructions.

H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

I. Apply sealants in joint devices in accordance with Section 07 9005.

J. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

K. Place concrete continuously between predetermined expansion, control, and construction joints.

L. Do not interrupt successive placement; do not permit cold joints to occur.

M. Place floor slabs in checkerboard or saw cut pattern indicated.

N. **Saw cut joints as quickly as possible after placing. Time delay after placing to saw cutting is expected to be no longer than 6 hours. Notify Architect if timeframe cannot be met. Use 3/16 inch thick blade, cut into one third depth of slab thickness, unless noted otherwise.**

O. Screed slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
1. Exposed Concrete Floors: 1/4 inch in 10 feet.
2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
3. Under Carpeting: 1/4 inch in 10 feet.

B. Correct the slab surface if tolerances are not as specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. **Concrete finisher shall leave concrete slabs clean, smooth and within specified tolerances to receive floor finishes specified in other sections, to the satisfaction of the floor finishes installer.**

B. Repair surface defects, including tie holes, immediately after removing formwork.

C. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

D. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

E. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include ceramic granular flooring, ceramic granular flooring, and ceramic granular flooring with full bed setting system.
   2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
   3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

F. Immediately after concrete slab finishing, Contractor shall meet with floor finishes installer(s) and concrete finisher and shall inspect slab(s) for suitability of slabs to receive floor finishes.
   1. Inspect for slabs for ridges and bumps. Concrete finisher shall fill local low spots, cracks, joints, holes, and other defects, to the mutual satisfaction of Contractor and floor finishes installer(s).
   2. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.
   2. High early strength concrete: Not less than 4 days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
   1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
   2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   3. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.
      b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Steiling Architecture and Nabholz Construction within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Steiling Architecture. The cost of additional testing shall be borne by the Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Steiling Architecture for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.12 SCHEDULE - CONCRETE TYPES AND FINISHES

A. Refer to structural drawings for notes and details by structural engineer regarding Schedule - Concrete Types and Finishes.

END OF SECTION

SECTION 03 3511
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

B. Section 03 3000 - Cast-in-Place Concrete: Curing compounds that also function as sealers.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

1.05 MOCK-UP

A. Mock-Up Size: 10 feet square.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Do not finish floors until interior heating system is operational.

C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 COATINGS

A. High Gloss Clear Sealer: Transparent, non-yellowing, water- or solvent-based coating.
   1. Composition: Acrylic polymer-based.
   2. Nonvolatile Content: 40 percent, minimum, when measured by volume.
   3. Products:
      a. W.R. Meadows, Inc; Deck-O-Grip W/B (slip-resistant): www.wrmeadows.com/#sle.
      b. W.R. Meadows, Inc; Decra-Seal W/B: www.wrmeadows.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Penetrating Sealer: Transparent, non-yellowing, water- or solvent-based coating.
   1. Composition: Siloxane.
   2. Products:
      a. Surface Koatings, Inc; Deco Guard: www.surfkoat.com/#sle.
      b. Surface Koatings, Inc; Deco Guard Plus: www.surfkoat.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

SECTION 03 3543
POLISHED CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Polished concrete finish in accordance with specified concept for polishing concrete.

B. All labor, material, equipment and services necessary for the diamond grinding and polishing of concrete floors in accordance with the specified concept.

C. Applying densifying impregnator/sealer and polishing to specified sheen level and aggregate exposure.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute.
   2. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute.
   3. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute.

B. American Society for Testing and Materials (ASTM):
   1. ASTM C 779 - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces, procedure A.
   2. ASTM E 1155 - Standard Test Method for Determining F (F) Floor Flatness and F(L) Floor Levelness Numbers; 1996.
   3. ASTM 1028 - Coefficient of Friction.
   4. ASTM C 805 - Impact Strength.
   5. ASTM G 23-81 - Ultraviolet Light & Water Spray.
   6. ASTM C 150 - Type I, II Portland Cement Conformity, depending on soil conditions.
   7. ASTM C 33 - Aggregate Conformity.

C. Other Tests:
   1. Reflectivity.

1.03 SUBMITTALS

A. Prior to commencement of work submit all product data sheets for concrete densifiers/hardeners, grinding equipment, vacuum systems, joint fillers and diamond tooling to be used.

B. Installation contractor's qualification history/data.

C. Manufacturer's Certification - Provide a letter of certification from product manufacturer(s) stating that the installer is a certified applicator and is familiar with the proper procedures, surface preparations and installation requirements recommended by the manufacturer(s).

D. Samples: Prior to commencement of work provide 10" x 10" finished samples for the Owner's review. See 1.06 Mock-Up.

E. Provide maintenance procedures using the V-Harr® Diamond cleaning system for the polished concrete floor to the Owner's Representative.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be an established company regularly engaged in the installation of polished concrete floor system with a minimum of five (5) years experience. Contractor shall furnish documentation regarding the successful completion of projects of similar magnitude and complexity.

B. Single Source Responsibility: All required materials and installation personnel to be provided by the installing contractor.

C. Pre-pour Meeting: The contractor shall conduct an onsite meeting before the pour/placement of the concrete slab related to this section with the Owners Representative, concrete finishing contractor and concrete polishing contractor to review requirements necessary for a successful polished floor surface.

D. Pre-installation Meeting: The Contractor shall conduct an onsite pre-installation meeting with the Owner in which the written floor finishing planis reviewed. Pre-installation meeting shall include a walk down of the floor to review the condition of the floor and to determine surface preparation requirements. Additional topics of discussion shall include:
   1. Floor surface preparation, cleaning, and protection.
   2. Previous products applied to concrete floors, including curing compounds.
   3. Application means and methods, including equipment to be used.
   4. Sequence of installation.
   5. Location of sample finished area.
   6. Desired sheen and appearance of the finished floor.
   7. Acceptability of finished slab and/or deficiencies of finished slab and associated remedies.

1.05 PROJECT/SITE CONDITIONS

A. Floor areas to be polished are to be free and clear of all obstacles including racking, fixtures and temporary equipment and materials in order to provide an open and uninhibited concrete slab.

B. Any anchoring bolts, cut off conduit and other associated items removed in a demolition process need to be removed or recessed a minimum of ¼" below lowest surrounding point of the concrete floor surface.

C. All previous flooring materials such as tile, carpet and wood flooring and associated adhesives are to be removed prior to the installation of the polished concrete flooring. Caution needs to be taken to ensure that no damage to the concrete floor takes place since the slab will be the finish product.

D. A minimum of 28 days of cure on new concrete should be provided before system installation is initiated.

E. Protection: General Contractor shall protect areas to receive polished concrete finish at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured:
   1. Protect from all petroleum stains during construction.
   2. Diaper all hydraulic powered equipment.
   3. Do not park vehicles on inside slab.
   4. No pipe cutting machines will be used on inside floor slab.
   5. Do not place reinforcing steel on interior slab, to avoid rust stains.
   6. Do not use acids or acidic detergents on slab.
   7. Inform all trades that the slab is to be protected at all times.
   8. No skids are to remain in contact with floor surface for an extended period of time.

F. Ensure that adequate lighting has been installed to support surface preparation and polishing application. A minimum of half the illumination of an open facility is required.

1.06 MOCK-UP

A. Install a completed 6'x 6' sample of the proposed system at location determined by the Owner's Representative. If approved by owner or owner's representative, the mock-up may be incorporated into the work. If a special concrete slab is placed for installation of sample, it must meet the same specification as the project's flatwork requirements for the polished concrete floor areas.

B. Equipment, tooling and products used are to be the same specified in Section 2.02 and the same that will be used for the entire project.

1.07 WARRANTY

A. The installer shall furnish a SINGLE SOURCE warranty for their system for a period of one year minimum.

1.08 ENVIRONMENTAL LIMITATIONS

A. Comply with manufacturers' written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.

B. Flatness and levelness:
   1. Finish Concrete shall have a minimum Floor Flatness rating of at least 40.
   2. Finish Concrete shall have a minimum Floor Levelness rating of at least 30.
   3. Finish Concrete shall be cured a minimum of 28 days or at which point equipment can be put on the slab and does not displace aggregate.

C. Application of finish system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.

D. Finish Concrete area shall be closed to traffic during finish floor application and after application, for the time as recommended by manufacturer.

PART 2 PRODUCTS AND MANUFACTURERS

1.01 ACCEPTABLE PRODUCTS AND MANUFACTURERS

A. 3 or 6 head specified floor grinder with at least 300 pounds of down pressure. For example: Lavina 25L-S, 30L-S, 32-S, 30G-S.

B. Dust extraction system for above grinders incorporating HEPA filter(s) capable of containing airborne dust, such as LVAINA® V-25, V-25L and V-32 vacuums.

C. Hand or edge grinders with dust extraction or dust suppression attachment.

D. Grinding heads - Approved Diamond Grit.
   1. Metal bonded diamonds: 30, 70, 120 grit
   2. Hybrid bonded diamonds: 50, 100 grit
   3. Resin bonded diamonds: 200, 400, 800 grit
   4. V-Har Diamonds: 800, 1800 grit

E. High speed burnisher - minimum 27 inch head generating 2,200 rpm or greater.

F. Penetrating liquid hardener/densifiers such as Prosoco LS/CS Lithium Densifier or Ameripolish HD 3S.

G. Metzger McGuire RS/88 semi-rigid joint filler.

H. Ameripolish Decorative Dyes by American Decorative Concrete or H&C Concrete Dye by H&C

I. Prosoco LS Guard by Prosoco or equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces scheduled to receive the work of this section for defects that will adversely affect the execution and quality of the work. Do not proceed until unsatisfactory conditions are corrected. Provide in writing to Owner a list of the conditions.

B. New Concrete: Confirm that a minimum of 28 days has elapsed before installation can begin. Also confirm if curing agents or hardening agents have been applied.

3.02 PREPARATION

A. Cleaning and preparation:
   1. Remove paint droppings by scraping, solvent stripper, and damp cloth. Do not use stripper with acidic pH.

2. Remove oil spots with emulsifier and oil absorbent material followed by detail scrub with high pH detergent.
3. Scrub floor with automatic scrubber capable equipped with soft brushes or pads. Use proper dilution of pH neutral detergent.
4. Clean the floor completely of materials and debris.
5. Protect adjacent surfaces as required to prevent damage by the concrete polishing procedure.
6. Set up grinding machine, dust extraction system, tooling and, if necessary, generator.

3.03 POLISHING

A. Follow the polishing guidelines listed below for floor surfaces that meet the Minimum Local Value Flatness and Levelness tolerances and surface finish specified - Salt and Pepper Aggregate with a Medium Gloss finish.
   1. Thoroughly clean the floor surface as specified in Section 3.02.
   2. Start the process with a 70 grit metal bonded diamond pass or lower until a uniform scratch pattern is developed. If a 30 grit is used, it will need to be followed by the 70 grit. Vacuum the floor thoroughly using squeegee vacuum attachment.
   3. Continue the process with 100 grit HD3 bonded diamond pass. Vacuum the floor thoroughly using squeegee vacuum attachment.
   4. Install penetrating densifier as per manufacturer's recommendation.
   5. Continue the process with a 200 grit resin bonded diamond pass. Vacuum the floor thoroughly using squeegee vacuum attachment.
   6. Continue polishing with a 400 grit resin bonded diamond pass. Vacuum the floor thoroughly using squeegee vacuum attachment.
   7. Continue polishing in succession with each resin diamond pass as listed below to progressively polish the floor slab to the desired level. Vacuum the floor thoroughly using squeegee vacuum attachment between each step.
      a. 800 grit resin bonded diamonds - low gloss.
      b. 1800 grit V-Harr bonded diamonds - medium gloss.
   8. Apply decorative dye at rate and at applicable step in polishing process as directed by manufacturer.
   9. Apply a sealer surface treatment. Use of microfiber applicator required.
   10. High speed burnish with a heat pad to complete the floor finish.

3.04 CLEANUP

A. Dispose of used materials in accordance with local regulations. Concrete dust collected from the installation of the system shall be the responsibility of the originator of the work.

3.05 PROTECTION

A. Keep premises clean and free of debris.

B. Protect adjoining surfaces from damage, dust and spatter related to the work of this section.
   1. Repair damage caused by the work of this section.
   2. Clean dust and spatter from adjoining surfaces.

C. Advise all contractors, vendors and others working in the areas completed that the concrete slab surface is the finished floor and is to be protected accordingly..

D. Protect floors from damage until Grand Opening. Use of plastic sheeting is not permitted. Use of tape on floor is not permitted.

E. Follow system manufacturer's instruction for cleaning to ensure proper protection from dirt and debris.

3.06 INSPECTION

A. Request acceptance by Owner's Representative for the finished floor.

B. Correct all unacceptable work to the satisfaction of the Owner's Representative.

END OF SECTION

SECTION 04 0800
SEISMIC-RATED MASONRY REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adjustable Reinforcement System.

B. Masonry Veneer Reinforcement System.

1.02 RELATED SECTIONS

A. Section 04 2900 - Engineered Unit Masonry

1.03 REFERENCES

A. ASTM A 82/A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2005a.

B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware; 2005.

C. ASTM A 580/A 580M - Standard Specification for Stainless Steel Wire; 2006.

D. ASTM A 641/A 641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2003.

E. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2005a.

F. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.

G. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened; 2005b

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's standard descriptive literature and printed installation instructions for each specified component.

1.05 QUALITY ASSURANCE

A. Provide systems tested and evaluated for Seismic Zones 3 in accordance with ICBO guidelines and ICBO Evaluation Service, Inc. Evaluation Report No. 4882.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Hohmann & Barnard, Inc; 30 Rasons Court, P.O. Box 5270, Hauppauge, N.Y. 11788-0270; Telephone 516-234-0600, FAX 516-234-0683.

B. Substitutions: See Section 01600 - Product Requirements.

2.02 ADJUSTABLE REINFORCEMENT SYSTEM

A. Horizontal Joint Reinforcement for Concrete Masonry Unit Walls:
   1. Acceptable product: #280 Dub'l Loop-Lok Ladder.
   2. Side rods: 9 gage.
   3. Cross rods: 3/16 inch.
   4. Side rod spacing: 2 inches less than nominal concrete masonry unit width.
   5. Cross rod spacing: 16 inches on center, butt-welded to side rods at each contact point.
   6. Double 3/16 inch diameter welded wire loops, spaced at 16 inches on center; inside loop dimension to provide 1-1/4 inches vertical adjustment of masonry anchor.

7. Wire: Steel, ASTM A 82/A 82M, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.

B. Masonry Wall Ties: Rectangular-shape brick anchor, 3/16 inch diameter wire, fitting into wire loops of horizontal joint reinforcement.
   1. Acceptable product: Box Byna-tie.
   2. Wire: Steel, ASTM A 82/A 82M, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.
   3. Length: Required for indicated wall cavity dimension.
   4. Deform wall tie to provide cavity drip at center of tie length.

C. Reinforcement Retaining Clip: #187-A Seismiclip; extruded rigid polyvinyl chloride (PVC), with one retaining ridge to secure 9 gage wire, and three retaining ridges to secure 3/16 inch diameter wire, grooved base for improved mortar bond.

D. Joint Reinforcement Wire:
   1. Wire: Steel, ASTM A 82/A 82M, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.
   2. Length: 10 feet minimum continuous piece length.

E. Rigid Insulation Retainer: Loop-Lok Washer; polyvinyl chloride (PVC) clip-type retainer for rigid board insulation; attaches to loop wires on horizontal joint reinforcement.

2.03 MASONRY VENEER REINFORCEMENT SYSTEM

A. Acceptable product: DW-10-X (X-Seal) Seismiclip Interlock System, comprising the following components:

B. Veneer Anchors: Formed metal veneer anchor having double-pointed legs to penetrate rigid insulation and sheathing for direct contact with steel stud framing, formed vertical slot for adjustable masonry wire ties, screw hole at top and at bottom of anchor for screw attachment to framing.
   1. Acceptable product: DW-10-X (X-Seal) Veneer Anchor.
   2. Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, Designation SS, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.
   3. Metal thickness: 12 gage.
   4. Screw hole size: 5/16 inch diameter.
   5. Leg lengths: Sizes for indicated sheathing and insulation thicknesses.

C. Masonry Wall Ties: Trapezoid-shape brick tie, fitting into vertical slot of veneer anchor.
   1. Acceptable product: Byna-tie.
   2. Wire size: 3/16 inch diameter.
   3. Wire: Steel, ASTM A 82/A 82M, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.
   4. Length: Required for indicated wall cavity dimension.
   5. Deform wall tie to provide cavity drip.

D. Reinforcement Retaining Clip: #187 Seismiclip; extruded rigid polyvinyl chloride (PVC), with one retaining ridge to secure 9 gage continuous wire and three retaining ridges to secure alternate 3/16 inch diameter continuous wire and 3/16 inch diameter Byna-tie, grooved base for improved mortar bond.

E. Joint Reinforcement Wire:
   1. Wire: Steel, ASTM A 82/A 82M, hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M, Class B2.
   2. Length: 10 feet minimum continuous piece length.

F. Sealing Tape: Textroseal; 40 mil thick multi-ply polyethylene/polymer modified asphalt, self-sealing; adhesive backed, 2-1/2 inches wide, 50 feet roll length.

G. Fasteners: Self-drilling self-tapping screws; hex washer head, size #10-16, lengths required for indicated insulation and sheathing thicknesses.

1. Metal: Zinc-coated steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine project conditions before beginning installation of masonry reinforcement systems components

B. Do not proceed with installation of vinyl products until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install masonry reinforcement system components in accordance with manufacturer's printed installation instructions.

B. Masonry Veneer Reinforcement System:
   1. Install sealing tape at stud locations to receive veneer anchors; install tape vertically, continuous full stud length.
   2. Install veneer anchors at stud locations; 16 inches on center vertically, 16 inches on center horizontally.
   3. Screw-attach veneer anchor to stud face; ensure full contact of veneer anchor legs with stud face.
   4. Install masonry wall tie at each veneer anchor location; install ties as exterior wythe of masonry construction progresses.
   5. Set reinforcement retaining clip in full mortar bed at each masonry wall tie location; secure tie wires in correct size ridges.
   6. Secure continuous masonry joint reinforcement wire in correct size ridge in reinforcement retaining clip.

END OF SECTION

SECTION 04 2900
ENGINEERED UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Brick Masonry Units - Match existing adjacent areas. For infill of existing openings in exterior walls.

C. Mortar and Grout.

D. Reinforcement and Anchorage

E. Flashings.

F. Lintels.

G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

B. Section 05 5000 - Metal Fabrications: Loose steel lintels.

C. Section 06 1000 - Rough Carpentry

D. Section 07 6200 - Sheet Metal Flashing and Trim: Masonry flashings.

E. Section 07 8400 - Firestopping: Firestopping at penetrations of masonry work.

F. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

B. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

E. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

G. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

H. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.

I. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2011.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

K. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.

L. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2014.

M. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

N. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

O. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.

P. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

R. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

S. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.

T. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

U. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

V. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

W. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale); 2014.

X. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.

Y. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

Z. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.

AA. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

BB. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, weep vent/cavity vent mesh system, fabricated wire reinforcement, weep vent/cavity vent mesh system, mortar and grout, weep vent/cavity vent mesh system, and weep vent/cavity vent mesh system.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ____ years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.08 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

C. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact wth such masonry.
   1. Protect base of walls from rain splashed mud and from mortar splatter by spreading covering on the ground and over wall surfaces.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Masonry Veneer, Standard: Comply with referenced standards and as follows:
   1. Size: Concrete standard masonry units with nominal face dimensions of 16 x 8 inches and nominal depth as indicated on the drawings for specific locations.
   2. Special Shapes: If required on drawings, provide non-standard chamfered banding units, window sills, keystone units, arched/partial arched units and other detailed conditions as shown on drawings
   3. Provide square-edged units for outside corners.
   4. Special Shapes: Provide non-standard blocks configured for corners (if required).
   5. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
   6. Substitutions: See section 01600 - Product requirements.

B. Concrete Block, standard:
   1. Concrete Block: Provide units complying with characteristics indicated below.
      a. Concrete block shall be manufactured with concrete aggregates conforming to ASTM C 33, 2 core, without cracks, chips, splits or other defects. Blocks shall be in accordance with ASTM C 90, Grade N. Type 1.fm = 2,000 psi minimum on net area in accordance with ASTM E447 "Compressive Strength of Masonry Prisms" and shall be U.L. approved for rated construction (as shown on the drawings).
      b. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated. Moisture content shall not exceed 30% at the time of delivery and installation. Smooth faced both sides unless noted for specific locations on the drawings.
   2. For below grade use, ASTM C-90 Grade N, normal weight.
   3. For other uses, ASTM C55, normal weight.
   4. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depth as indicated on the drawings for specific locations.

2.02 BRICK UNITS

A. Brick units shall match existing colors and construction of the existing Riverside High School building in Lake City, Arkansas.

B. The cost of labor and accessories, including grout, reinforcing and installation shall be included in the base bid.

C. Manufacturers:
   1. General Shale Brick; _____: www.generalshale.com/#sle.
   2. Acme Brick, Inc. : www.acmebrick.com
   3. Substitutions: See section 01 6000 - Product Requirements.

D. Facing Brick: ASTM C 216, Type FBS, Grade SW.
   1. Color and texture: To be selected by Architect to match existing construction.
   2. Actual Size: As indicated on drawings.
   3. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

A. Refer to structural drawings for notes and details by structural engineer regarding Mortar And Grout Materials.

B. Masonry Cement: ASTM C91/C91M Type N.

C. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Hydrated Lime: ASTM C207, Type S.
   2. Mortar Aggregate: ASTM C144.
   3. Grout Aggregate: ASTM C404.

D. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): Mortar color for all Concrete Masonry shall be colored as selected by Architect from manufacturer's full range.
   2. Manufacturers:
      a. Davis Colors: www.daviscolors.com/#sle.
      b. Lambert Corporation: www.lambertusa.com/#sle.
      c. Solomon Colors: www.solomoncolors.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

E. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com/#sle.
   2. WIRE-BOND: www.wirebond.com/#sle.

B. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; galvanized finish.

C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss. Refer to Structural notes and specifications.
   2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

D. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss, with adjustable ties or tabs spaced at 16 in on center.
   2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
   3. Size: 0.1483 inch side rods with 0.1875 inch cross rods and adjustable components of 0.1875 inchwire, width of components as required to provide not less than 5/8 inch of mortar coverage from each masonry face.
   4. Vertical adjustment: Not less than 2 inches.

E. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

2.05 MEMBRANE ASPHALTIC FLASHING MATERIALS:

1. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) minimum total thickness; 8 mil cross-laminated polyethylene bonded to adhesive rubberized asphalt, with a removable release liner.
   a. Manufacturers:
      1) Advanced Building Products, Inc: www.advancedbuildingproducts.com/#sle.
      2) Heckmann Building Products, Inc: www.heckmannbuildingprods.com/#sle

3) WIRE-BOND: www.wirebond.com/#sle.
4) Substitutions: See Section 01 6000 - Product Requirements.

B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
1. Manufacturers, Synthetic Rubber Products:
a. Mortar Net Solutions; BTL-1 Butyl Sealant: www.mortarnet.com/#sle.

2.06 ACCESSORIES

A. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 1/2 inch wide x by maximum lengths available.

B. Weeps: Polyester mesh.
1. Manufacturers:
a. Mortar Net USA, Ltd: www.mortarnet.com.
b. Substitutions: See Section 01 6000 - Product Requirements.

C. Cavity Mortar Control: Polyester mesh.
1. Manufacturers:
a. Mortar Net USA, Ltd: www.mortarnet.com.
b. Substitutions: See Section 01 6000 - Product Requirements.

D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS

A. Refer to structural drawings for notes and details by structural engineer regarding Lintels.

2.08 MORTAR MIXES

A. Refer to structural drawings for notes and details by structural engineer regarding Mortar Mixes.

B. Ready Mixed Mortar: ASTM C1142, Type RM.

C. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

D. Colored Mortar: Proportion selected pigments and other ingredients to match Steiling Architecture's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

E. MORTAR MIXING
1. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
2. Maintain sand uniformly damp immediately before the mixing process.
3. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
4. Do not use anti-freeze compounds to lower the freezing point of mortar.
5. If water is lost by evaporation, re-temper only within two hours of mixing.
6. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.09 GROUT MIXES

A. **Refer to structural drawings for notes and details by structural engineer regarding Grout mixes.**

B. If Structural Drawings do not specify, provide all grout to comply with ASTM C 476 for grout for use in construction of reinforced unit masonry. Grout shall be transit-mixed in accordance with ASTM C 94 and shall consist of one part Portland cement, 2-1/2 parts sand two parts pea gravel, and adequate water to produce a concrete of approximately ten inches slump, and shall have an ultimate compressive strength of 3000 psi in 28 days. Use grout of consistency indicated or if no indicated, of consistency (fine or course) at time of placement which will completely fill all spaces intended to receive grout.

1. Use fine grout in spaces less than 4" in horizontal dimension, unless otherwise indicated.
2. Use course grout in spaces 4" or more in least horizontal dimension, unless otherwise indicated.

2.10 GROUT MIXING

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

B. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

C. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Clean reinforcement of loose rust.

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave.

D. Brick Units:

3.04 PLACING AND BONDING

A. Refer to structural drawings for notes and details by structural engineer regarding Placing And Bonding.

B. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

C. Lay hollow masonry units with face shell bedding on head and bed joints.

D. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

E. Remove excess mortar as work progresses.

F. Interlock intersections and external corners, except for units laid in stack bond, unless detailed or noted otherwise.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

I. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

3.05 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 6 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings to within 1/4 inch of exterior face of masonry.

C. Extend plastic flashings to within 1/4 inch of exterior face of masonry.

D. Lap end joints of flashings at least 4 inches and seal watertight with flashing sealant/adhesive.

3.06 GROUTING

A. Refer to structural drawings for notes and details by structural engineer regarding Grouting.

B. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   3. Place grout for spanning elements in single, continuous pour.

3.07 CONTROL AND EXPANSION JOINTS

A. Provide control and expansion joints at nominal 25 feet on center. Verify actual joint locations with Architect before installation.

B. Do not continue horizontal joint reinforcement through control or expansion joints.

C. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

D. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

E. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.

F. Form expansion joint as detailed on drawings.

3.08 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 16 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.09 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.10 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11 PARGING

A. Dampen masonry walls prior to parging.

B. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

C. Strike top edge of parging at 45 degrees.

3.12 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

E. Wash all masonry surfaces with non-acid cleaning solution.

3.13 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.14 SCHEDULES

A. Refer to Drawings for locations of each type of masonry construction.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

B. Shop fabricated stainless steel serving counter.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04 2900 - Engineered Unit Masonry: Placement of metal fabrications in masonry.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

I. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.

J. ASTM B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric); 2012.

K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

N. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy , T6 temper.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
   1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
   2. Rungs: 3/4 inch diameter solid round bar spaced 12 inches on center.
   3. Space rungs 7 inches from wall surface.

B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

C. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

D. Lintels: As detailed; prime paint finish.

E. Frames for Wall Openings: Channel and Angle sections; prime paint finish.

2.05 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Interior Aluminum Surfaces: Class I natural anodized.

C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.07 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-structural dimension lumber framing.

B. Rough opening framing for doors, windows, and wall openings.

C. Subflooring.

D. Roof-mounted curbs.

E. Roofing nailers.

F. Roofing cant strips.

G. Preservative treated wood materials.

H. Fire retardant treated wood materials.

I. Miscellaneous framing and sheathing.

J. Concealed wood blocking, nailers, and supports.

K. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.

B. Section 07 7200 - Roof Hatches and Curbs: Prefabricated roof curbs.

1.03 REFERENCE STANDARDS

A. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.

D. AWPA C9 - Plywood -- Preservative Treatment by Pressure Processes; American Wood Protection Association; 2003.

E. AWPA C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Protection Association; 2002.

F. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

G. PS 1 - Structural Plywood; 2009.

H. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

I. PS 20 - American Softwood Lumber Standard; 2010.

J. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Douglas Fir-Larch, unless otherwise indicated.
   2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

C. Provide sustainably harvested wood; see Section 01 6000 - Product Requirements for requirements.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Douglas Fir-Larch.
   2. Grade: No. 2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Subfloor/Underlayment Combination: Oriented strand board wood structural panel; PS 2, rated Single Floor.
   1. Bond Classification: Exterior.
   2. Performance Category: 19/32 PERF CAT.
   3. Span Rating: 20.
   4. Edges: Square.
   5. Edges: Tongue and groove.
   6. Surface Finish: Fully sanded face.
   7. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 200 days.
   8. Provide fastening guide on top panel surface with separate markings indicating fastener spacing for 16 inches, 19.2 inches and 24 inches on center, respectively.
   9. Warranty: Manufacturer's standard lifetime limited warranty against manufacturing defects and that panels will not delaminate or require sanding due to moisture absorption damage from exposure to weather for up to the stated period.
   10. Manufacturer: Equal to: Georgia Pacific "Blue Ribbon OSB Sturd-I-Floor"

B. Wall Sheathing: Oriented strand board structural wood panel with factory laminated rigid plastic insulation board, and water-resistive and air barrier layer.
   1. Sheathing Panel: PS 2, Exposure 1.

C. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.

3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as required to support new retrofit roof framing.

B. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Chalkboards and marker boards.
   7. Wall paneling and trim.
   8. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring/Underlayment Combination: Glue and Screw to framing; staples are not permitted.

B. Subflooring: Glue and Screw to framing; staples are not permitted.

C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

D. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. All communicatiion and electrical room mounting boards are to be finish painted with 2 coats fire retardant paint before installation.
      a. Color: White, unless instructed otherwise by Architect.
   2. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.

3. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
4. Install adjacent boards without gaps.
5. Size: 48" high, by length of 48", 72" or 96" (max. size to fit space). inches, installed horizontally at 48" a.f.f. to bottom edge

3.06 TOLERANCES

A. Framing Members: 1/16 inch from true position, maximum.

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.08 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

C. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 08 1416 - Flush Wood Doors.

C. Section 09 9113 - Exterior Painting: Painting and finishing of finish carpentry items.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1/4" per foot.

C. Samples: Submit samples of wood trim 6 inch long in all finishes available.

1.05 QUALITY ASSURANCE

A. Grade materials in accordance with the following:
   1. Softwood Lumber: In accordance with rules certified by ALSC; www.alsc.org.
   2. Hardwood Lumber: In accordance with NHLA Grading Rules; www.natlhardwood.org.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000.

2.02 WOOD TREATMENT

A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
   1. Required for all subfloors and wood framing at Dining Room Platform construction.

B. Provide identification on fire retardant treated material.

2.03 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.04 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 2100
WALL AND CEILING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Faced Batt Glass Fiber Insulation and vapor retarder in all exterior wall and ceiling construction, and filling header cavities, crevices and voids around doors and windows.
   1. All S.A.T. ceilinigs in this project shall have new faced batt glass fiber insulation installed.
   2. Ceiling insualtion shall be 24" x 48" with a minimum R value of 30.
   3. Exterior wall insualtion shall be full depth of stud cavity with a minimum R value of 21.

B. Unfaced Batt Glass Fiber Insulation in designated interior partitions for acoustical treatment, as shown on the drawings.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete slabs and foundations.

B. Section 04 2723 - Cavity Wall Unit Masonry: Masonry walls enclosing insulation.

C. Section 09 2116 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM C240 - Standard Test Methods of Testing Cellular Glass Insulation Block; 2008 (Reapproved 2012).

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023, with Editorial Revision (2024).

C. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

G. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS

2.01 BATT THERMAL INSULATION MATERIALS (FACED)

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Nabholz Construction's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt, complying with ASTM C665; friction fit.
   1. Kraft or Foil Faced for non-exposed installations.
   2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   4. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   5. Thermal Resistance: R-value of minimum 21 at exterior walls and minimum 30 at ceilings.
   6. Thickness: full stud depth at exterior walls and as required to achieve required R-values.

7. Manufacturers:
    a. CertainTeed Corporation: www.certainteed.com/#sle.
    b. Johns Manville: www.jm.com/#sle.
    c. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BATT ACOUSTICAL INSULATION MATERIALS (UNFACED)

A. Batt Insulation: ASTM C 665; preformed glass fiber batt; conforming to the following:
1. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 50 or less, when tested in accordance with ASTM E 84.
2. Combustibility: Non-combustible when tested in accordance with ASTM E 136.
3. Provide insulation made without formaldehyde.
4. Thickness:
    a. 6 inch for 6 inch, 8 inch and 12 inch stud cavities.
    b. 3.5 inch for 3-5/8 inch stud cavities.
5. Facing: Unfaced.
6. Manufacturers:
    a. CertainTeed Corporation: www.certainteed.com.
    b. Johns Manville Corporation: www.jm.com.
    c. Owens Corning Corp: www.owenscorning.com.
7. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 THERMAL BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and ceiling spaces. Fill all gaps and voids. Do not compress

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Lap ends and side flanges of membrane over framing members.

F. Screw facing flanges in place at maximum 6 inches on center.

G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

H. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

I. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

J. Coordinate work of this section with requirements for vapor retarder specified in Section 07 2510.

3.03 ACOUSTICAL BATT INSTALLATION

A. Refer to drawings for required insulation locations.

B. Install in designated partitions to full stud depths and heights.

C. Trim insulation neatly to fit spaces. Insulate all miscellaneous gaps and voids.

D. Insulate inside spaces of opening headers.

3.04 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire-resistance rated assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCES

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

C. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

D. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

E. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. With minimum 3 years documented experience installing work of this type.

1.05 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

A. Manufacturers:
   1. Hilti, Inc: www.us.hilti.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Firestopping: Any material meeting requirements.

C. Fire Ratings: See Drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

B. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.03 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: See Drawings for required systems and ratings.

B. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches or less: Any material meeting requirements.

C. Firestopping at Combustible Pipe and Conduit Penetrations, of diameter 4 inches or less: Any material meeting requirements.

D. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches or less: Any material meeting requirements.

E. Firestopping at Cable Tray Penetrations: Any material meeting requirements.

F. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Any material meeting requirements.

G. Firestopping at Control Joints (without Penetrations): Any material meeting requirements.

2.04 MATERIALS

A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
   1. Durability and Longevity: Permanent.
   2. Color: Black, dark gray, or red.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers.
   1. Durability and Longevity: Permanent.
   2. Manufacturers:
      a. USG: www.usg.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. Pecora Corporation: www.pecora.com.
      c. Thermafiber, Inc: www.thermafiber.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

E. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
   1. Durability and Longevity: Permanent ; suitable for pedestrian traffic.
   2. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.
      b. 3M Fire Protection Products: www.3m.com/firestop.
      c. Hilti, Inc: www.us.hilti.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

F. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
   1. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.

b. 3M Fire Protection Products: www.3m.com/firestop.
c. Hilti, Inc: www.us.hilti.com.
d. Specified Technologies, Inc: www.stifirestop.com.
e. Substitutions: See Section 01 6000 - Product Requirements.

G. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Install labeling required by code.

3.04 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Sealants at exposed concrete expansion joints and sawcut joints at interior and exterior.

C. Precompressed foam sealers.

1.02 RELATED REQUIREMENTS

A. Section 03300 - Cast-In-Place Concrete: Sealants required in conjunction with paving, walks and slabs.

B. Section : Firestopping sealants.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).

F. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; current edition.

G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

A. See Section , for submittal procedures.

B. Product Data: Provide data indicating sealant .

1.05 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Silicone Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. GE Plastics: www.geplastics.com.
   3. Pecora Corporation: www.pecora.com.
   4. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Polyurethane Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

C. Polysulfide Sealants:
   1. Pecora Corporation: www.pecora.com.
   2. BASF Construction Chemicals-Building Systems: www.chemrex.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

D. Acrylic Sealants (ASTM C920):
   1. Tremco Global Sealants: www.tremcosealants.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

E. Butyl Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

F. Acrylic Emulsion Latex Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

G. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
   2. Sandell Manufacturing Company, Inc: www.sandellmfg.com/#sle.
   3. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   4. Substitutions:

2.02 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
   1. Size as required to provide seal when installed.
   2. Provide product recommended by manufacturer for traffic-bearing use.
   3. Applications: Use for:
      a. Exterior wall expansion joints.

C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications: Use for:
      a. Concealed sealant bead in sheet metal work.
      b. Concealed sealant bead in siding overlaps.

D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Other interior joints for which no other type of sealant is indicated.

E. Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: , ,100 percent solids by weight.
   2. Hardness: after 7 days, when tested in accordance with ASTM D2240 Shore A.
   3. Joint Width: .

F. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; component.
   1. Color: Colors as selected by Architect.
   2. Applications: Use for:
      a. At exposed expansion joints in floors.
      b. At exposed sawcut Joints in interior and exterior floor slabs.

G. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; component.
   1. Color:

2. Applications: Use for:
   a. Joints in sidewalks and vehicular paving.

2.03 ACCESSORIES

A. Primer: Non-staining type, to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ; oversized to percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face below adjoining surface.

H. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face below adjoining surface.

I. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor surfaces.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Placement of joint cover assembly frames in formwork.

B. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.

C. Section 04 2723 - Cavity Wall Unit Masonry: Placement of joint cover assembly frames in masonry.

D. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

B. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

E. Maintenance Materials: Furnish the following for Trumann School District's use in maintenance of project.
   1. See Section 01 6000 for additional provisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Construction Specialties, Inc: www.c-sgroup.com/#sle.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Floor Joints Subject to Movement:
   1. Manufacturers:
      a. Construction Specialties, Inc; Flush Seismic Floor Covers: www.c-sgroup.com/#sle.
   2. Basis-of-Design Product: Construction Specialties, Inc., Model PCS-2G
      a. Size required: 5 inch width x 50 ft. 0 inches (field verify all dimensions).
      b. Floor to Floor: Surface mounted.
      c. Type: Glide plate.
         1) Exposed Metal: Aluminum.
            (a) Finish: Class II, clear anodic.

2) Cover-Plate Design: Serrated

d. Attachment Method: Mechanical anchors.

e. Load Capacity: Standard duty.

f. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION

A. Clean joint and seal with specified floor joint sealer. Refer to Section 07 9005 Joint Sealers.

B. Install components and accessories in accordance with manufacturer's instructions.

C. Locate anchors at interval recommended by manufacturer, but not less than3 inches from each end and not more than 24 inches on center.

D. Align work plumb and level, flush with adjacent surfaces.

E. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel frames for non-rated wood doors.

B. Sizes / profiles as shown on drawings and verified in field by contractor to replace existing.

C. Hollow metal borrowed lite glazing frames.

D. Accessories, including glazing where specified.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware.

B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

C. Section 09 9123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   5. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
   6. Finish: Factory primed, for field finishing.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. General:
   1. Where indicated, existing exterior hollow metal frames are to be re-used in new location.
   2. Where indicated, remove existing exterior metal doors and frames as specified.
   3. Existing frames to be reused are to be scraped of old paint, holes filled, and sanded smooth prior to receiving new prime paint and finish paint as specified.
   4. If any existing metal frames are found to be severely damaged or rusted trhough contractor shall contact architect for inspection, review and further instructions.
   5. Comply with the requirements of grade specified for corresponding door.
      a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.
   6. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

7. Frames in Masonry Walls: Size to suit masonry coursing and to match existing openngs to remain.
8. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
2. Frame Finish: Factory primed and field finished.

E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

F. Existing mullions for pairs of doors shall receive same treatment and conditioning as door frames.

2.04 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
1. Color: As selected by Steiling Architecture from manufacturer's standard range.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

2.05 ACCESSORIES

A. Glazing: As specified in Section 08 8000, factory installed.

B. Door Light Frame: Formed sheet steel, mitered corners; prepared for countersink style tamper proof screws. 20 gauge cold rolled steel. Self-attaching. Prime painted for field finishing.
1. Equal to "Anemostat" LoPro metal vision frame.

C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.06 FINISHES

A. Primer and Finish Paint: Refer to Section 09 9000 Paints and Coatings.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating on interior surface of all steel frames in contact with concrete, grout, or masonry surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify all opening sizes and tolerances required.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors in existing frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Coordinate installation of hardware.

1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

E. Coordinate installation of glazing.

F. Coordinate installation of electrical connections to electrical hardware items.

G. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire rated and non-rated.
   1. Factory finished.
   2. Sound rated (Doors 813A and 813B only)

B. Transom panels.

1.02 RELATED REQUIREMENTS

A. Section 06 2000 - Finish Carpentry: Wood door frames.

B. Section 08 1113 - Hollow Metal Doors and Frames.

C. Section 08 7100 - Door Hardware.

D. Section 08 8000 - Glazing.

E. Section 09 9000 - Painting and Coating: Site finishing of opening frames.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

C. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Specimen warranty.

D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

E. Samples: Submit two samples of door veneer, 6 x 6 inch in size illustrating wood grain, stain color, and sheen.

F. Warranty, executed in Trumann School District's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Graham Wood Doors: www.grahamdoors.com/#sle.
   2. Marshfield DoorSystems, Inc: www.marshfielddoors.com/#sle.
   3. Mohawk Flush Doors, Inc: www.mohawkdoors.com
   4. Southwood Door Co. : www.southwooddoor.com
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Level: Premium Grade, in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 01300.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Wood veneer facing with factory transparent finish .

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White birch, veneer grade in accordance with quality standard indicated, rotary cut, plain sliced, with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

B. Facing Adhesive: Type I - waterproof.

2.05 ACCESSORIES

A. Glazing: Single vision units, 1/4 inch glass, tempered, clear. As specified in Section 08 8000.

B. Door Light Frame: Refer to Section 081113 Steel Doors and Frames for specified model.

C. Door Light Frame: _____, mitered corners; prepared for countersink style tamper proof screws.
   1. Rated doors: Equal to 'Anemostat' Fire Glass Stop #FGS75 or approved equal.
   2. Door light frames to be field painted with sprayer. Brush painting is not acceptable.

D. Removable mullion at pairs of doors where specified on drawings: Refer 08 7100 Hardware for specified model.

2.06 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. Factory machine doors for specified hardware. Refer to Section 087100 Door Hardware.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
   1. Exception: Doors to be field finished.

F. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

A. Factory finish doors in accordance with specified quality standard:
   1. Transparent Finish: Transparent catalyzed polyurethane, Premium quality, 40-55 sheen.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

F. Install door glazing frames with screws on interior space side of door.
   1. Install all screws in glazing frames.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 by 84 inches surface area.

D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inches surface area.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 08 4313
ALUMINUM STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum storefront framing, with vision glass.
   1. Refer to aluminum elevation and detail drawings for glazing types.
   2. 1" clear, insulated, glass standard at exterior window opening locations. Safety glazing where required by Code if not shown.
   3. Fixed window units.

B. Aluminum doors with vision glass.
   1. 1/4" clear, safety glass.

C. Aluminum trim plates and covers where shown on Contract drawings.

D. Aluminum insulated metal panels where window air conditioning units to be installed. Refer to Section 08 8000 Glazing.

E. Weatherstripping.

F. Door hardware.

G. Perimeter sealant.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Steel attachment devices.

B. Section 06 2000 - Finish Carpentry: Wood window sills.

C. Section 07 2500 - Weather Barriers: Perimeter air and vapor seal between glazing system and adjacent construction.

D. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.

E. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.

F. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.

C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; American Architectural Manufacturers Association; 2009.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2010.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2012.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2012.

I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

K. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).

L. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2000 (Reapproved 2008)

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, dimensional limitations.

E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Exterior: YKK AP America Inc; Product YES 45 TU, Center Glazed, thermally broken: www.ykkap.com.
   a. Entrance Doors: Product 50D, Wide Style, 1/4" tempered glazed door.
   b. Mid Rail required.
   c. Finish to be: Dark Bronze
2. Exterior: United States Aluminum Corp; Product I.T.451 thermally broken; center glazed.: www.usalum.com.
   a. Entrance Doors: Product Series 550 Wide Style, 1/4" tempered glazed door.
   b. Mid Rail required.
   c. Finish to be: Dark Bronze
3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Aluminum-Framed Storefront system: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch insulating glazing, exterior installation.
   2. Glazing Rabbet: For 1/4 inch monolithic glazing, interior installation.
   3. Glazing Position: Centered (front to back).
   4. Mullion Dimensions: For exterior insulated applications: 2 inches wide by 4-1/2 inches deep.
   5. Mullion Dimensions: For interior non-insulated applications: 1 3/4 inches wide by 4 inches deep.
   6. Water Leakage Test Pressure Differential: 10 lbf/sq ft.
   7. Air Infiltration: <.06 cmf.
   8. CRF: 61
   9. U Value:.60

B. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing stops: Flush.
   3. Cross-Section: 2"x 4 1/2" inch nominal dimension (exterior use).
   4. Cross-Section: 1-3/4"x 4" inch nominal dimension (interior use).

C. Doors: Glazed aluminum:
   1. Thickness: 1-3/4 inches.
   2. Top Rail: 6 inches nominal.
   3. Mid Rail: 8 inch nominal.
   4. Vertical Stiles: 6" nominal.
   5. Bottom Rail: 10 inches (per ADA requirements)
   6. Glazing Stops: Square.
   7. Finish: Same as storefront.

D. Fixed Windows:
   1. Fixed insulated windows to be constructed of same components as storefront system, exterior usage.
   2. Finish same as storefront.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

C. Fasteners: Stainless steel.

D. Exposed Flashings: 0.032 inch thick aluminum sheet; finish to match framing members.

E. Concealed Flashings: 0.018 inch thick galvanized steel.

F. Perimeter Sealant: Type as specified in Section 07 9005.

G. Glass: As specified in Section 08 8000.
   1. Glass in Exterior Framing: Type 1" insulated, low "E" on 2nd surface, ARGON GAS filled, tinted or clear as specified, tempered glass at locations specified and as required by code..
   2. Glass in Doors: Type 1/4" tempered, tinted or clear, as specified.

H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.04 FINISHES

A. Class I Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating or AAMA 612 electrolytically deposited colored anodic coating with electrolytically deposited organic seal; not less than 0.7 mils thick.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.05 HARDWARE

A. Hardware must be ADA (Arkansas adopted) compliant.

B. Doors:
   1. Items of hardware to be furnished and installed per leaf under this Section 08 4313
      a. 1 Door Bottom Sweep: H7107 (Exterior doors).
      b. 1 Threshold: Standard threshold, 4", ADA compliant (Exterior doors).
      c. 1 Perimeter Gasket By Door Manufacturer: (Exterior doors).
      d. Metal finishes to be: Same as storefront framing system.
   2. Refer to Section 08 7100 Door Hardware for items to be furnished under Section 08 7100 and installed under this section:

2.06 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce components internally for door hardware.

G. Reinforce framing members for imposed loads.

H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and seal of perimeter air and vapor barrier materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install hardware using templates provided.

K. Install glass in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

L. Install perimeter sealant in accordance with Section 07 9005.

M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.
   4. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 08 Section "Door Hardware Schedule".
   2. Division 08 Section "Hollow Metal Doors and Frames".
   3. Division 08 Section "Flush Wood Doors".

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified installer of Windstorm assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that

indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) or equivalent with 15 years' experience available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Windstorm Assembly Installer Qualifications: Installers are to be factory trained and certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

E. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Seven years for heavy duty cylindrical (bored) locks and latches.
   2. Five years for exit hardware.
   3. Twenty five years for manual surface door closer bodies.
   4. Two years for electromechanical door hardware.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
      a. Three Hinges: For doors with heights 61 to 90 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
      b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
      a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
   5. Acceptable Manufacturers:
      a. Hager Companies (HA).
      b. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Acceptable Manufacturers:
      a. McKinney Products (MK).
      b. Pemko Manufacturing (PE).

C. Continuous Geared Double-acting Hinges. ANSI/BHMA A156.26 Grade 1-600 Certified continuous geared hinges. Hinges are non-handed and allow the door to swing up to 100 degrees in either direction.
   1. Acceptable Manufacturers:
      a. Pemko Manufacturing (PE).

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
   1. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor.
   2. Furnish dust proof strikes for bottom bolts.
   3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
   4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:
    a. Door Controls International (DC).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

B. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
    a. Acceptable Manufacturers:
        1) Rockwood Manufacturing (RO).
        2) Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Match Facility Restricted Keyway.

D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.
2. **Existing System: Master key or grand master key locks to Owner's existing system.**
    a. **Sargent Restricted key system – No substitutions**

E. Key Quantity: Provide the following minimum number of keys:
1. Top Master Key: One (1)
2. Change Keys per Cylinder: Two (2)
3. Master Keys (per Master Key Group): Two (2)
4. Grand Master Keys (per Grand Master Key Group): Two (2)

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Multi-Point Locksets, Security: Three-point locking system device engineered for in-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked.
1. Acceptable Manufacturers:
    a. Sargent Manufacturing (SA) - FM7100 Series. No substitutions

B. Lock Trim Design: As specified in Hardware Sets.

2.06 AUXILIARY LOCKS

A. Cylindrical Deadlocks: ANSI/BHMA A156.5, Grade 1, cylindrical type deadlocks to fit standard ANSI 161 preparation and 1 3/8" to 1 3/4" thickness doors. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.
   1. Acceptable Manufacturers:
      a. Sargent Manufacturing (SA) - 480 Series. No Substitutions

2.07 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
   4. Dustproof Strikes: BHMA A156.16.

2.08 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
      a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.
   3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
   4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is not acceptable except in any case where the door light extends behind the device as in a full glass configuration.
   5. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
   6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with four threaded studs for thru-bolts.
      a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.

b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.
1. Acceptable Manufacturers:
a. Sargent Manufacturing (SA) - 80 Series. No Substitutions

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.
1. Acceptable Manufacturers:
a. Sargent Manufacturing (SA) - 980S Series. No Substitutions

2.09 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
   1. Acceptable Manufacturers:
      a. Sargent Manufacturing (SA) - 351 Series.
      b. Norton Door Controls (NO) - 7500 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following:
      a. Stainless Steel: 300 series, 050-inch thick, with countersunk screw holes (CSK).
   4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
   5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
   6. Acceptable Manufacturers:
      a. Rockwood Manufacturing (RO).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Acceptable Manufacturers:
      a. Rockwood Manufacturing (RO).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:
   1. National Guard Products (NG).
   2. Pemko Manufacturing (PE).
   3. Reese Enterprises, Inc. (RS).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.

D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer's Abbreviations:
1. MK - McKinney
2. PE - Pemko

3. RO - Rockwood
4. SA - Sargent
5. NO - Norton
6. HA - Hager
7. SU - Securitron
8. RU - Corbin Russwin

3.09 HARDWARE SCHEDULE

A. **SET 1**

Doors: 108 (existing door & frame)

PE 1 ea Threshold 1710A x DOW

Balance of existing hardware to remain.

B. **SET 2**

Doors: 114A (relocate doors - new frame)

Re-use existing hardware.

C. **Set: 3**

Doors: 106B, 107A, 108A, 108B, 111A, 116A, (new door & frame)

MC 3 ea Hinge TA2714 4.5" x 4.5" US26D

SA 1 ea. Office Lock 28 70 10G05 LL US26D

H 1 ea. Wall Stop 236W x US32D

H 3 ea. Silencers 307D

D. Note: Door thresholds and closers must meet ADA requirements.

END OF SECTION 087100

SECTION 08 8000
GLAZING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Standard 1/4" glass and glazing for hollow metal door view lites..

B. Unframed mirrors.

1.02 REFERENCES

A. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured (Flat, for Glazing, Mirrors and other uses.

B. FS DD-G-1403 - Glass, Plate (Float), Sheet, Figured, and Sprandrel (Heat Strengthened and Fully Tempered).

C. FS TT-S 1543 - Sealing Compound: Silicone Rubber Base (for Caulking, Sealing, and Glazing in Buildings and Other Structures).

D. SIGMA No. 64-7-2 - Specification for Sealed Insulating Glass Units.

1.03 QUALITY ASSURANCE

A. Conform to Flat Glass Marketing Association (FGMA) Glazing Manual.

1.04 SUBMITTALS

A. Submit product data in accordance with Section 01 3000.

B. Submit sealed glass unit manufacturer's certificate indicating units meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site and store and protect products in accordance with manufacturer's recommendation and Section 01 6000.

1.06 WARRANTY

A. Provide ten year manufacturer's warranty.

B. Warranty: Include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Glass Products:
   1. AGC Flat Glass North America, Inc.
   2. PPG Industries, Inc.
   3. Libby-Owens Ford.
   4. Cardinal Glass Industries: www.cardinalcorp.com.

B. Insulated Metal Infill Panels:
   1. Columbia Architectural Products, Inc.
   2. Mapes Industries, Inc.

C. Substitutions: Under provisions of Section 01 6000.

2.02 GLASS MATERIALS (AS REQUIRED)

A. Laminated Glass: 1/4" clear, float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.
   2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.
   3. Laminated Glass Manufacturers: Cardinal Glass Industries: www.cardinalcorp.com.

B. Clear Float Glass - 1/4" clear, glazing quality.

C. Glazing Compound and Setting Blocks: Type and number recommended by the manufacturer of the glazing condition.

2.03 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene: 70-90 Shore A durometer hardness.

B. Spacer Shims: Neoprene; 50 Shore A durometer hardness.

C. Glazing Tape: Preformed Butyl Polyisobutylene compound with or without integral resilient tube spacing device; as recommended by manufacturer of tape and glass for application indicated; 10-15 Shore A durometer hardness; coiled on release paper.

D. Glazing Gaskets: Resilient polyvinylchloride extruded shape to suit glazing requirements; black color. Refer to Section 08 4313 for aluminum framing system.

PART 3 - EXECUTION

3.01 INSPECTION, PREPARATION, AND CLEANING

A. Follow manufacturer's instructions when cutting insulated metal panels.

B. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section.

C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses.

3.03 CLEANING

A. After installation, mark pane with an "X" by using removable paste.

B. Remove glazing materials from finish surfaces.

C. Remove labels after work is completed.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Acoustic wall insulation (Specified in Section 07 2000)

C. Gypsum wallboard, regular type, walls and ceiling areas.

D. Joint treatment and accessories.

E. Cementitious backing board at tiled wall areas to be provided and installed by Section 09 3000 Tile.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

C. Section 09 2215 - Metal Stud Framing System: Non-loadbearing

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).; 2013.1.

B. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).; 2013.1.

C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.

G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

H. GA-253 - Recommended Specifications for the Application of Gypsum Sheathing; Gypsum Association; 1999.

1.04 SUBMITTALS

A. Product Data: Provide data on gypsum board, exterior sheathing, accessories, exterior sheathing, joint finishing system, exterior sheathing, and _____.

B. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board application and finishingwith minimum 5 years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.01 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com/#sle.

2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
3. National Gypsum Company: www.nationalgypsum.com/#sle.
4. USG Corporation: www.usg.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Application: Use water resistant gypsum wallboard at "wet wall areas" (toilets, custodial, kitchens) on all walls not receiving tile finish. Refer to Schedule at end of this specification.

2.02 ACCESSORIES

A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Products:
a. Same manufacturer as framing materials.

B. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Ready-mixed vinyl-based joint compound.

C. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Laterally brace entire suspension system.
2. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs at 16 inches on center, typical, or as specified on drawings or specified U.L. Design Assemblies.
1. Extend partition framing to structure where indicated and to ceiling in other locations.
2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install support blocking for support of plumbing fixtures, toilet partitions, toilet accessories, hardware, and any other items scheduled for attachment to stud partition walls.
1. Framed openings.
2. Wall mounted cabinets.
3. Plumbing fixtures.
4. Toilet partitions.
5. Toilet accessories.
6. Wall mounted door hardware.

7. Pencil sharpener locations.
8. Handrail locations.

3.03 BOARD INSTALLATION

A. Comply with ASTM C 840 and ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.

B. For walls 12'-0" tall or less, apply gypsum panels parallel to studs (vertically). Position edges over stud for attachment. Use maximum practical lengths to eliminate end joints. Fit edges closely, but not forced together. Stagger joints on opposite sides of partitions.

C. For walls over 12'-0" tall, apply gypsum panels perpendicular to studs. Position ends over studs for perpendicular application. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together. Stagger joints on opposite sides of partition.

D. For single-layer parallel application of gypsum panels, space screws 12"o.c. in field of panels and along vertical abutting edges. For perpendicular panel application, space screws 16"o.c. in field and 8"o.c. staggered along abutting end joints. Stagger all joints on opposing sides of partitions.
   1. Exception: Tapered edges to receive joint treatment at right angles to framing.

E. For ceiling installation, apply gypsum panels of maximum practical length with long dimensioin perpendicular to furring. Fit ends and edges closely, but not forced together. Fasten panels with 1" type "S" screws spaced 12"o.c. in field of panels and along abutting ends and edges.

F. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   1. Not more than 30 feet horizontally nor more than 20 feet vertically apart on walls and ceilings. Coordinate locations with Architect.

B. Corner Beads: Reinforce all vertical and horizontal exterior corners with corner bead fastened with 1-1/8" drywall screws 9"o.c. on both flanges along entire length of bead.

C. Edge Trim: Where assembly against masonry or other dissimilar material, apply metal trim over panel edge and fasten with 1-1/8" drywall screws 9"o.c.

D. Screws: Power-driven at least 3/8" from edges or ends of panel to provide uniform dimple 1/32" deep.

3.05 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows in schedule below.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.07 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.

B. Level 2: Utility areas and areas behind cabinetry.

C. Level 3: Walls scheduled to receive textured wall finish.

D. Level 4: Walls and ceilings scheduled to receive flat or eggshell type paint finish.

E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss type paint finish.

F. All Main corridors and classroom wing corridors shall receive Finish Level 5 full height.

3.08 BOARD SCHEDULE

A. Standard gypsum board ::
   1. Full height in all scheduled areas.

B. Water resistant gypsum board:
   1. All restroom walls except at ceramic tile backer board.
   2. All other walls concealing plumbing piping.

END OF SECTION

SECTION 09 2216
METAL STUD FRAMING SYSTEM

PART 1 -- GENERAL

1.01 WORK INCLUDED

A. Provide steel studs, track, bridging and related accessories for non-load bearing interior walls, furr downs, bulkheads, etc.

B. Submittals required: manufacture's literature: materials description, structural properties, load tables and recommended installation instructions.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store above ground and in a dry place within the building. All damaged or otherwise unsuitable material, shall be immediately removed from the job site.

1.03 1.03 REFERENCES

A. American Iron and Steel Institute (ANSI)
   1. " Specification for the Design of Cold-Formed Steel Structural Members".
   2. " Cold-Forms Steel Design Manual" (Latest)

B. American National Standards Institute (ANSI)
   1. "ANSI A58.1 – "Roof, Wind and Snow Loads".

C. American Society for Testing and Materials (ASTM):
   1. ASTM A446 – Steel Sheet, Zinc-coated (galvanized) by Hot- Dip Process, Structural (Physical) Quality.
   2. ASTM A570 Hot- Rolled Carbon Steel Sheet & Strip, Structural Quality.
   3. ASTM A525 – Sheet Steel, Zinc- Coated (Galvanized) by the HOT- Dip Process, General Requirements.
   4. ASTM A611 – "Standard Specification for Steel, Cold Rolled Sheet, Carbon, Structural."
   5. ASTM C955 – "Standard Specification for Lead Bearing Steel Studs, Runners (Track), Bracing, and Bridging."

D. American Welding Society (AWS):
   1. AWS D1 – "Structural Welding Code" and D1.3 – "Specifications for Welding Sheet Steel in Structures."
   2. AWS – " Standard Qualification Procedure

1.04 SUBMITTALS

A. Steel stud submittals are required for this project.

B. Provide type, size, gauge and physical properties as described below and as required by the manufacturerer's load and height tables, and in accordance with Structural Drawings and the Arkansas Fire Prevention Code, 2012 Edition.

PART 2 – PRODUCTS

2.01 MATERIALS

A. **Refer to Structural Drawings for Load Bearing Stud requirements.**

B. Non-Load Bearing Studs: 3-5/8" or 6" , ASTM C-645 33 ksi yield, 20 ga., cold rolled, G-60 galvanized "C" shaped metal drywall studs, punched for utility access. Installed at 16"on center.

C. Metal studs shall be factory pre-punched for utility access, horizontal bracing, etc. Field punching shall not be allowed.

D. Provide lateral brace channels at mid height of all walls 9'-0" or less in height. All walls greater than 9'-0" in height shall have lateral brace channels at 4'-0" o.c. vertical a.f.f. Lateral brace channels shall be 1-1/2" x 1/2" x 16 msg C.R channels welded or screw attached to stud with 2-1/2" x 20 ga. clip angles at 4'-0" o.c. maximum. Refer to Detail Drawing.

E. Tracks, furring and stiffener channels shall be of the same material as the studs set in them, unless noted otherwise on drawings. ASTM C-955.

F. Fasteners recommended by manufacturer.

G. Hanger Wire: 48" o.c. each way, 10 gage galvanized saddle ties minimum 16 gage.

H. Gypsum Board Ceiling Framing System:
   1. 1-1/2" steel cold-rolled channels at 48" o.c.
   2. 7/8" hat shaped channels at 16" o.c.

I. Acceptable Manufacturers:
   1. Dietrich Metal Framing; www.dietrichindustries.com
   2. Harrison Manufacturing Co., Memphis, TN
   3. Consolidated Systems Incorporated, Memphis, TN. (901) 365-0226
   4. Substitutions: See Section 01600 - Product Requirements.

J. Accessories:
   1. Sill seal gasketing strips: Polyethylene gasketing strips equal to Dow Styrofoam Sill Seal at all exterior stud wall locations.

PART 3 -- EXECUTION

3.01 GENERAL

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing surfaces.

C. Layout partitions and bulkheads in accordance with dimensions shown on the drawings.

D. Install all materials in accordance with the manufacturer's recommendations.

3.02 METAL STUD INSTALLATION

A. Install sill seal gasketing strips under stud sill track at all exterior stud wall locations.

B. Align all studs for installation of horizontal bracing thru prepunched slot holes.

C. Secure top and bottom tracks at 24" o.c., locating to wall and partition layout. Provide an anchor within 2" of ends and joints. Lap top runner track of metal framing 16" so both ends are anchored to adjacent studs. Protect track from damage. Align tracks accurately to the layout at base and top of studs. Secure tracks as recommended by the stud manufacturer for the type of construction involved, except do not exceed 24"o.c. spacing for nail or power driven fasteners, nor 16"o.c. for other types of attachment. Provide fasteners at corners and end of tracts.

D. Exterior walls and partitions extending to underside of roof framing shall be secured to structure by use of manufacturer's standard slip track of same gage as studs.

E. Extend all framing from floor to underside of roof deck where indicated on drawings. Where studs are not extended to the deck, brace the top to the structure above at 8' oc.

F. Place studs vertically at 16" o.c., or as noted on drawings, and in direct contact with abutting walls, door frame jambs, and partition corners. All open sides to face same direction. Bottom of stud track to bear on floor. Connect all studs to track in accordance with manufacturers recommendations. Align stud web openings.

G. Do not notch studs for installation of anchors, pipes, conduits, etc.

H. Construct corners using three studs. Double studs at door and window jambs and ends of partitions. Anchor double and triple studs to each others. Install intermediate studs above and below openings to match wall stud spacing.

I. Provide deflection allowance.

J. Coordinate installation of wood blocking for attachment of fixtures, accessories, door stops, etc. Install metal framing for attachment of electrical and mechanical items.

K. Frame all openings for passage of ducts with sill, head and jamb members.

L. All studs shall be one piece.

M. Check straightness of wall at floor and ceiling locations, at doors, windows, and penetrations and where framing abuts different construction.

N. Provide a lateral brace channel above doors, windows, and openings, which extends at least 2 stud spaces beyond openings. Refer to detail drawing.

O. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load carrying members is not permitted. Cut framing components squarely for attachment to perpendicular members or as required for an angular fit against abutting members. Hold members positively in place until fastened

3.03 CEILING FRAMING INSTALLATION

A. Install in accordance with U.S. Gypsum published data SA/923.

B. Coordinate location of hangers and grid systems with other work. Verify location of recessed and suspended light fixtures prior to commending work.

C. Install ceiling frame independent of walls, columns, and above-ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

F. Use wall board of maximum practical length to keep joints to a minimum. End joints shall be neatly fitted and staggered. Hanger wires to be 4' o.c. each way, channels, to be 48" o.c. drywall channels 16" o.c. tied or clipped to channels. 5/8" gypsum board screwed to drywall channels 12" o.c.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system, Seismic Zone 3, Category D.

B. Acoustical units.

1.02 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.

E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2019.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on ceiling acoustical insulation, ceiling acoustical insulation, and ceiling acoustical insulation.

C. Samples: Submit two samples 4 by 4 inch in size illustrating material and finish of acoustical units.

D. Maintenance Materials: Furnish the following for Trumann School District's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Provide 2 unopened cartons of Type 1 ceiling tiles and 1 unopened cartons of Type 2 ceiling tiles.. Deliver to Owner when contract is complete.

1.04 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. **Type 1 Lay-in Panels**:
   1. Standard Acoustical Panels: Armstrong, School Zone, 15/16" Square Lay-in panels, #1713 white, 24" x 24" x 3/4" lay in panels, having class A flame spread - 25 or under, NRC - .70, CAC - 35.
   2. Requires the Armstrong 15/16" PRELUDE suspension system as specified.
   3. Acceptable Manufacturers:
      a. Armstrong, World Industries, Atlanta, Georgia 30339
      b. USG Interiors, Inc., Chicago Illinois 60680; Product: USG Radar Education #22421
   4. Substitutions: See Section 01600 - Product Requirements.

5. Requires the Armstrong 15/16" PRELUDE suspension system as specified.

B. **Type 2 Lay-in Panels:**
   1. Gypsum Reinforced Panels: Equal to: Vinylrock II, as manufactured by Capaul Architectural Acoustics.
      a. Substrate: Glass fiber reinforced gypsum
      b. Surface: .002" embossed, white vinyl, durable, scrubbable, USDA accepted surface.
      c. Acoustical Properties: Sound Attenuation STC Class 35-39
      d. Light Reflective: LR 1 (0.75 or greated)
      e. Size: 1/2" x 24" x 24".
      f. Moisture Vapor Transmission: 214g/100m2/hr. (7.4 Perms) per ASTM E96-53T.
      g. Abrasion Resistance: Gardner Scrubbability (WG-2000). After 2000 cycles (double rubs) test was discontinued with no wear due to abrasion by the brush, degradation of the vinyl or color change of the pigment.
   2. Substitutions: See Section 01600 - Product Requirements.

2.02 SUSPENSION SYSTEM(S)

A. All suspension systems to have heavy-duty main beams, rated for IBC Seismic Category D, E, and F.

B. Acceptable Manufacturers:
   1. Acceptable Manufacturers:
      Armstrong World Industries
      Celotex Corporation
      USG Interiors, Inc.
      Chicago Metalic Corp.
      Donn Acoustical Suspension System
   2. No Others Allowed.
   3. Color: White

C. Suspension system: Type 1 & Type 2 ceilings
   1. System shall meet requirements of Armstrong 15/16" PRELUDE, Seismic Zone 3-4, Seismic Category D, E, and F.
      a. Main Beams: 1-1/2" hgt. with 1" flange, double web.
      b. Cross Beam: 1-1/2" hgt. with 1" flange, double web.
      c. Wall Angle Molding: 1" x 1" standard; (2" x 2" where required for Seismic constraint).
   2. All steel roll formed parts shall be chemically cleaned, electro-galvanized and bonderized to resist corrosion and form a Chemical affinity for paint. All surfaces shall receive a high baked enamel finish. Color shall match ceiling panels. Steel stamped parts shall be chemically cleansed, electro galvanized and treated with a chromate conversion coating.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

E. Perimeter Moldings: Same material and finish as grid.
   1. Size: As required for installation conditions and specified Seismic Design Category.
   2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
   3. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions for seismic Zone 3, Category D and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical batt insulation above ceiling panels in tight neatly fitted pattern to fill all spaces.

E. Install units after above-ceiling work is complete.

F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

G. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with seismic rating requirements.

I. Install hold-down clips on panels within 10 ft of an exterior door.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.05 SCHEDULE

A. Acoustical Units:
   1. Refer to Reflected Ceiling Plans for specified ceiling locations.
   2. Type 1 - Install in all areas unless noted otherwise.
   3. Type 2 - Install in Kitchen and Serving Area.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING AND BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base on walls and in toe spaces of all casework.
   1. Provide base in roll goods of maximum lengths only.
   2. 4 FOOT STRIPS NOT ALLOWED.

B. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Steiling Architecture's initial selection.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing as per manufacturer's requirements.

1.05 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.06 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Provide 100 sq ft of flooring, 40 lineal feet of base, of each type and color specified.

PART 2 PRODUCTS

2.01 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: To be selected by Architect from all available manufacturer's colors.
   4. Length: Roll goods, maximum lengths only. Minimum piece length 24" (1 per wall).
   5. Color: Color as selected from manufacturer's standards.
   6. Accessories: Premolded external corners and end stops. Tight-cut mitered internal corners.
   7. Manufacturers:
      a. Armstrong: www.armstrong.com
      b. Johnsonite, a Tarkett Company: www.johnsonite.com.
      c. Roppe Corp: www.roppe.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

B. Moldings, Transition and Edge Strips: Rubber - Carpet/Tile to Concrete Transition Strips.

PART 3 EXECUTION

3.01 EXAMINATION

A. Immediately after concrete slab finishing, Contractor shall meet with floor finishes installer(s) and concrete finisher and shall inspect slab(s) for suitability of slabs to receive floor finishes, to the mutual satisfaction of the Contractor and floor finishes installer(s).

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks, sand or trash that might telegraph through flooring; clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

C. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.

D. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

E. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

F. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
   1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
   2. Alkalinity: pH range of 5-9.

G. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 RESILIENT BASE

A. Fit joints tightly and true vertical. Maintain minimum dimension of 36 inches between joints.

B. Miter internal corners. At external corners and end stops, use premolded units.

C. Install base on solid backing. Verify any wallcovering materials have been installed to 2 inches above floor surfaces to provide for a solid substrate. Bond tightly to wall and floor surfaces with minimum 2 beads of adhesive, without gaps or bulges. Top bead to be installed in straight line approx. 3/4" below top of base.

D. Scribe and fit to door frames and other interruptions.

E. Install straight and level to variations of plus or minus 1/8 inch over 10 feet.

3.04 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

C. Clean, seal, and wax resilient flooring products in accordance as noted in Section 2.03.D above.

D. Clean resilient flooring products in accordance with manufacturer's instructions.

3.05 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

3.06 SCHEDULE

A. Resilient Base: To be selected by Architect..

END OF SECTION

SECTION 09 6714
CERAMIC GRANULAR FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trowel applied resin floor flooring.

B. Trowel applied resin wall base and wainscot 40" high, with extruded aluminum base cap (no exceptions).

C. Install metal termination strips at all doorways and openings abutting disimilar floor materials.

1.02 RELATED SECTIONS

A. Section 03 3000: Concrete sub-floor .

1.03 REFERENCES

A. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2002a.

B. ASTM D 4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2001.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2007.

D. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available .

C. Samples: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each color specified.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Include damage prevention procedures, maintenance procedures, recommended maintenance materials, repairing surface, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, secure area.

B. Store materials in area of installation for three days prior to installation to achieve temperature stability.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature required by manufacturer for minimum period of 72 hours prior to, during, and 24 hours after installation of materials.

B. Maintain relative humidity in area of installation at 70 percent, maximum, during installation and for minimum period of 72 hours after installation.

1.08 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Provide 2 gal of flooring material, of each color selected, for building maintenance purposes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Desco Coatings, Olathe, Kansas; www.descocoatings.com .
   1. Product: Desco Quartz Cremona TG, Semi-Gloss, High Wear, Color to be selected.

B. Other Acceptable Manufacturers:
   1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Hand trowel-applied resin with grade 11 aggregrates.
   1. Mosaic look with synthetic aggregates in vivid colors.
   2. Hand troweled to 3/16" thickness over epoxy primer.
      a. Base thickness same as floor thickness
   3. Floors: Translucent Aggregates added to provide slip resistance, Semi-Gloss, High Wear surface.
   4. Walls: Orange Peel texture, Semi-Gloss, High Wear surface.

2.03 ACCESSORIES

A. Subfloor Filler: Type recommended by flooring material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Base Cap: Clear anodized extuded aluminum base cap, continuous, all areas to receive granular ceramic base. Size as required to match base thickness.
   1. Equal to Schluter Systems, RONDEC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Immediately after concrete slab finishing, Contractor shall meet with floor finishes installer(s) and concrete finisher and shall inspect slab(s) for suitability of slabs to receive floor finishes, to the mutual satisfaction of Contractor and floor finishes installer(s).

B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive floor finishes.

C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive coatings.

D. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.

3.02 PREPARATION

A. Inspect for subfloor ridges and bumps.

B. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

E. Apply primer to surfaces required by manufacturer.

F. Install aluminum base caps at walls.

G. Install metal termination strips at all doorways and openings abutting dissimilar floor finishes.

3.03 INSTALLATION

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness indicated.

C. Finish to smooth surface, sloping to floor drains as required.

D. Extend primer, base and top coats up intersecting and perimeter vertical surfaces, 6 inches. Terminate top edge clean, straight, and level.

E. Install aluminum base caps at walls.

F. Cove floor at vertical surfaces.

3.04 PROTECTION

A. Prohibit traffic on floor finish for one week after installation.

B. Barricade area to protect flooring until cured.

3.05 SCHEDULE

A. Install granular ceramic flooring and accessories at locations as shown on Room Finish Schedule.

END OF SECTION

SECTION 09 6813
CARPET TILES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

1.03 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

C. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.

D. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

F. Maintenance Materials: Furnish the following for Trumann School District's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Carpet Tiles: 1 full carton of each color and pattern installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carpet Tile Manufacturer:
   1. Aladdin Commercial: www.aladdincommercial.com
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Carpet Tile Type Modular: Tuftedmanufactured in one color dye lot.

1. Product: Artfully Done Tile / 2B56
2. Color: Brilliantly Excellent #979 (verify matches existing carpet)
3. Construction: Tufted
4. Backing: UltraSet
5. Dye Method: Solution/Yarn Dyed
6. Fiber Type: Colorstrand SD Ny
7. Face Weight: 15 oz./sy
8. Pile Density: 5,382 oz./yd
9. Gauge: 1/12 (4.7 rows/cm)
10. Stitches: 12.2 stitches/in (4.8 stitches/cm)
11. Pattern Repeat: N/A
12. Soil Release: Yes
13. Standard Size: 24" x 24" approx. (60.96cm x 60.96 cm)
14. Warranties: Lifetime Fiber Performance for Wear, Lifetime for Tuft Bind Strength (edge ravel, yarn pulls, zippering), Lifetime Protection from Delamination Failure, Lifetime Fiber Performance for Static, Lifetime Moisture Barrier, Lifetime Dimensional Stability
15. Testing Specifications - Pill Test: Yes
16. Testing Specifications - Flooring Radiant Panel: Class 1
17. Testing Specifications - Smoke Density: Less than 450 flaming (ASTM E 662)
18. Testing Specifications - Static Test: Less than 3 kv (AATCC-134)
19. Testing Specifications - Lightfastness Test: Yes

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Rubber,color as selected .

C. Provide transition/reducing strips tapered to meet abutting materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

C. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Starting installation constitutes acceptance of sub-floor conditions.

C. SURFACE PREPARATION- Dust, dirt, debris and noncompatible adhesive must be removed before the installation begins. Surfaces must be smooth and level with all holes and cracks filled with Portland cement-based patch reinforced with polymers or primed with TriSeal Sealer.

D. LATEX OR OLD ADHESIVES - Must be mechanically scraped down to a bare residue flat with the concrete substrate or covered with a skim coat of Portland cement-based patch reinforced with polymers. Any old adhesive residue must also be covered with TriSeal Sealer. Note: Failure to remove or seal old latex or cut back adhesive may cause installation failure, plasticizer migration, shifting, buckling or edge curling; these conditions will not be covered under warranty.

E. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

F. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

G. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. FULL SPREAD ADHESIVE SYSTEM- J&J Industries requires a full spread adhesive system for installation of Nexus Modular (carpet tile). Fully spread Commercialon® Premium Modular Pressure Sensitive Adhesive using a 1/32 x 1/16 x 1/16 "U" or "V" notch trowel or spread using a 3/8" foam paint roller. Keep the roller saturated and wet with adhesive throughout the installation in order to maintain a constant spread rate. Allow to completely dry so adhesive does not transfer when touched. The spread rate for Commercialon Premium Modular Adhesive is approximately 140 sq. yds. per four gallon bucket. Nexus® Modular Spray Adhesive is available in a 14 lbs cylinder (coverage is approx. 165 sq yds). Note: Inadequate amounts of adhesive can cause modules to shift and move and will not be covered under warranty. Warranty coverage requires the use of Commercialon Premium Modular Adhesive. J&J Industries will not be responsible for the adhesive bond where other adhesives have been used.

D. TILE PLACEMENT - Arrows are embossed or printed on the module backing to show pile direction. To ensure proper alignment, check spacing every ten modules. Measure ten modules; proper spacing should be within ¼ inch. Continue to check spacing every ten modules throughout the entire installation.

E. PALLET AND BUNDLE SEQUENCING - It is very important to install J+J/Industries modules in the order they were manufactured; this is easily accomplished by selecting pallets in sequential order and following the numbers located on each bundle. Typically, an installation will begin with the lowest bundle numbers and progress through the highest numbers until the project is complete. Installing modules by bundle sequence will assure the most even uniform look possible. (For layout and installation instructions refer to J+J/Invision Carpet Installation Handbook or CRI 104 Standards.)

F. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

G. Lay carpet tile in square pattern, with pile direction alternating to next unit, set parallel to building lines.

H. Fully adhere carpet tile to substrate. FINISHED INSTALLATION- Roll entire job with 75-100 lb. roller after completion of installation.

I. Trim carpet tile neatly at walls and around interruptions.

J. Complete installation of edge strips, concealing exposed edges.

3.04 INSTALLATION ON STAIRS

A. Use one piece of continuous carpet for all treads and risers. Apply seam adhesive to all cut edges.

B. Lay carpet with pile direction in the length of the stair.

C. Adhere carpet tight to stair treads and risers.

3.05 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. LOOP PILE CONSTRUCTION--Carpet modules with loop pile constructions may experience yarn blossoming at the edges, which is consistent with this type of construction. Clipping or shearing the yarn edges can remedy this condition.

C. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 8430
SOUND-ABSORBING WALL AND CEILING UNITS - LAMVIN, INC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabric-covered sound-absorbing units.

1.02 RELATED REQUIREMENTS

A. Section 09 5100 - Acoustical Ceilings.

1.03 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023, with Editorial Revision (2024).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

C. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Indicate fabrication and installation details, including fabric orientation, panel layout, and wood grain orientation.

D. Samples:
   1. For Initial Selection: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.
   2. For Verification: Fabricated samples of each type of panel specified; 12 by 12 inches, showing construction, edge details, and fabric covering.

E. Maintenance Materials: Furnish the following for Trumann School District's use in maintenance of project:
   1. See Section 01 6000 - Product Requirements for additional provisions.
   2. Extra Panels: Quantity equal to 20 percent of total installed, but not less than 5 of each type.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of type specified in this section, with at least three years of documented experience.

B. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions and shop drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon delivery, inspect crates and cartons. Check for correct address on freight bills and materials. Verify quantity and completeness of order, including accessories. Prepare damage or shortage report, if deemed necessary.

B. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped cartons. Do not open cartons until units are needed for installation.

C. Alert freight carrier within five working days if concealed damage is discovered and request inspection. Document inspection with freight company and send to manufacturer. Do not remove damaged cartons from receiving area, and save packing material.

D. Do not return damaged goods or fill out claim to freight company unless authorized by manufacturer.

E. Store units flat in dry, well-ventilated space and protect from damage.

F. Acceptance of materials commences when installation begins.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 1-year manufacturer warranty for material defects and fabrication. Complete forms in Trumann School District's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lamvin, Inc; Artful Acoustics, Nature Collection / Wood Print: www.lamvin.com/#sle.

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FABRIC-COVERED SOUND-ABSORBING UNITS

A. General:
   1. Prefinished, factory-assembled, fabric-covered panels and baffles.
   2. Surface Burning Characteristics: Fire rating Class A, when tested in accordance with ASTM E84.

B. Panels for Walls:
   1. Panel Core: Manufacturer's standard rigid fiberglass core with copolymer surface.
   2. Sound Absorption: Noise reduction coefficient (NRC) of 0.90 when tested in accordance with ASTM C423; for Type J mounting, comply with ASTM E795.
   3. Finish: Straight, flat, wrinkle free
   4. Panel Size: (6) 48" x 8", (4) 36" x 8", and (6) 24" x 8".
   5. Panel Thickness: 1 inch.
   6. Edges: Manufacturer's standard, Mitered.
   7. Edge Profile: Square.
   8. Color: As selected by Steiling Architecture from manufacturer's full range.
   9. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.
   10. Mounting Method: Impaling clips with adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and finished surfaces for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install acoustical units in locations indicated on drawings, follow manufacturer's installation instructions.

B. Install mounting accessories and supports in accordance with shop drawings and manufacturer's recommendations.

C. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

D. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
   1. Plumb and level.
   2. Flatness.
   3. Width of joints.

3.03 TOLERANCES

A. Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width.

3.04 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.05 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of Steiling Architecture.

END OF SECTION

SECTION 09 9000
PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surfaces to be painted / refinished:
   1. All exposed new and existing painted and unpainted concrete block and brick units.
   2. All exposed new and existing wood and plywood panels, including the (interior) exposed roof over the existing basketball court and bleachers areas.
   3. Concrete floors to be stripped and sealed.
   4. Existing suspended basketball goals and mounting systems.
   5. Existing (and new) steel building components exposed to view.

B. Surface preparation.

C. Field application of paints and other coatings.

D. Scope: All exposed non-factory finished items, both exterior and interior, shall be painted as per paint schedule, including (but not limited to):
   1. Exposed faces and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Mechanical and Electrical:
      a. In finished areas, paint new shop-primed items.
      b. On the roof and outdoors, paint all new equipment that is exposed to weather or to view, which is not factory-finished.

E. Do Not Paint or Finish the Following Items except as specifically noted above and/or on the drawings:
   1. Items fully factory-finished unless specifically so indicated; **materials and products having factory-applied primers are not considered factory finished.**
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically so indicated.
   9. Ceramic and other tiles.
   10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   11. Glass.
   12. Acoustical materials, unless specifically so indicated.
   13. Concealed pipes, ducts, and conduits.

F. See Schedule - Surfaces to be Finished, at end of Section.

1.02 RELATED REQUIREMENTS

A. Section 05 3511 - Concrete Floor Finishes

B. Section - : Shop-primed items.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. GreenSeal GS-11 - Paints and Coatings; 2013.

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. See Section , for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of and a maximum of , in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: for interiors; for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Finishes: for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each coating material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: All primer coatings shall be white color (no tint color allowed).

C. Primers: Where not specified, if the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

D. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

E. Chemical Content: The following compounds are prohibited:
   1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

F. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Steiling Architecture after award of contract.
   2. Allow for minimum of 2 colors for each system, unless otherwise indicated, without additional cost to Trumann School District.
   3. Extend colors to surface edges; colors may change at any edge as directed by Steiling Architecture.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under, unless directed otherwise by Architect.

2.03 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: filler.

C. Fastener Head Cover Material: filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: percent.
   3. Interior Wood: percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing coatings that exhibit surface defects, in existing areas adjacent to new construction.

D. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

F. Seal surfaces that might cause bleed through or staining of topcoat.

G. Remove mildew from impervious surfaces by scrubbing with solution of and bleach. Rinse with clean water and allow surface to dry.

H. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply 100% acrylic primer immediately following cleaning.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of 100% acrylic primer.

J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance; each succeeding coat slightly darker than the previous.

E. Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Divisions 15 and 16 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Paint shop-primed equipment, where indicated.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. See Section - Quality Requirements, for general requirements for field .

3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

3.08 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.

B. Paint the surfaces described below under Schedule - Paint Systems.

C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated or directed by Architect.

3.09 SCHEDULE - PAINT SYSTEMS

A. Unless noted otherwise, all exposed finish surfaces that are not factory finished are to be painted or finished in accordance with the following schedule. Coating surfaces for which type of coating has not been specified hearin as specified for surfaces of similar materials and conditions of exposure.

B. Trade names and numbers used herein, unless noted otherwise, are those of Sherwin-Williams Industries (S-W), Benjamin Moore (BM),and Farrell-Calhoun (FC) for the purpose of establishing quality standards for painting materials.

C. Wood Stained:
   1. 1st coat: S-W Oil Stain
      a. BM Penetrating Stain #234
      b. FC Wood Kraft Penetrating Wiping Stain #1110
   2. 2nd coat: Spray applied: S-W Promar Easy Sealer B44FT8
      a. BM Low Luster Polyurethane #C435
      b. FC Wood Kraft Satin Polyurethane Varnish #1120
   3. 3rd coat: Spray applied: S-W Sherwood High Build, Medium Rubbed Lacquer T70FT1
      a. BM Low Luster Polyurethane #C435
      b. FC Wood Kraft Satin Polyurethane Varnish #1120
   4. 4th coat: Rubbed Effect: S-W Sherwood High Build, Medium Rubbed Effect
      a. BM Low Luster Polyurethane #C435
      b. FC Wood Kraft Satin Polyurethane Varnish #1120

D. Wood Painted:
   1. 1st coat, primer: White color: S-W Industrial Enamel, B542
      a. BM Fresh Start Acrylic #023
      b. FC Waterborne 100% Acrylic Enamel Undercoater #699
   2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
      a. BM Super Spec 100% Acrylic Semi-Gloss #281
      b. FC 100% Acrylic Interior Semi-Gloss Latex Enamel #600 Line
   3. 3rd coat: Top coat: S-W Industrial Enamel, B542
      a. BM Super Spec 100% Acrylic Semi-Gloss #281
      b. FC 100% Acrylic Interior Semi-Gloss Latex Enamel #600 Line

E. Hollow Metal Doors and Frames: Spray applied. Brush marks not acceptable. Apply final coat just prior to final wall paint coat installation.
   1. 1st coat, primer: White color: S-W Kem Kromik Metal Primer
      a. BM Shop-Coat #M14
      b. FC Tuff-Boy Rust-Stop White Primer #1022
   2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
   3. 3rd coat: Top coat: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line

F. Metal, Ferrous, unprimed, exterior and and interior:
   1. 1st coat, primer: White color: S-W Kem Kromik Metal Primer
      a. BM Shop-Coat #M14
      b. FC Tuff-Boy Rust-Stop White Primer #1022
   2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
      a. BM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
   3. 3rd coat: Top coat: S-W Industrial Enamel, B542
      a. BM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
   4. Total DFT of 2nd and 3rd coats not less than 6.0 mils.

G. Metal, Ferrous, factory primed, exterior and interior: (Touch -up shop finish painted items with like materials.)
   1. 1st coat, primer: White color: S-W Kem Kromik Metal Primer
      a. BM Shop-Coat #M14
      b. FC Tuff-Boy Rust-Stop White Primer #1022
   2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
   3. 3rd coat: Top coat: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
   4. Total DFT of 2nd and 3rd coats not less than 6.0 mils.

H. Metal, Galvanized, exterior and interior:
   1. 1st coat, primer: White color: S-W Kem Kromik Metal Primer
      a. BM DTM Alkyd Gloss #M26
      b. FC 100% Acrylic All Purpose Metal Primer #5-56
   2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
         1) FC Tuff-Boy Waterborne 100% Acrylic DTM Enamel #8000 at contractor's option
   3. 3rd coat: Top coat: S-W Industrial Enamel, B542
      a. BM DTM Alkyd Gloss #M26
      b. FC Tuff-Boy Industrial Alkyd Gloss Enamel #800 Line
         1) FC Tuff-Boy Waterborne 100% Acrylic DTM Enamel #8000 at contractor's option
   4. Total DFT of 2nd and 3rd coats not less than 6.0 mils.

I. Metal, Miscellaneous: Paint all exposed pre-engineered metal building components, misc. exposed steel, HVAC ductwork, electrical conduits, and plumbing vents:
   1. 1st coat, primer: White or black, to match top coat: Comply with paint manufacturer recommended primer systems for steel, aluminum, and galvanized surfaces

2. 2nd coat: S-W Dry Fall Flat, B48W60, Brilliant white or flat black, as required by architect.
    a. BM Super Spec DTM Sweep-up Spray Alkyd Flat
    b. FC Tuff-Boy Oil-Base Dry Fall Flat #990
        1) FC Tuff-Boy 999 Water-Base Dry Fog Flat at contractor's option.
3. 3rd coat: S-W Dry Fall Flat, B48W60, Brilliant white or flat black, as required by architect.
    a. BM Super Spec DTM Sweep-up Spray Alkyd Flat
    b. FC Tuff-Boy Oil-Base Dry Fall Flat #990
        1) FC Tuff-Boy 999 Water-Base Dry Fog Flat at contractor's option.

J. Concrete Masonry Units, non-epoxy coating:
1. 1st coat, primer: White color: S-W Loxon Block Surfacer A24W200
    a. BM Block Filler #M88
    b. FC Interior/Exterior Acrylic latex Masonry Block Filler #470A
    c. Required Coverage 50-100 sq. ft./gal., 16 mil. wet thickness, 8 mil. dry DFT
    d. Surfacer to be roller applied. DO NOT SPRAY APPLY.
2. 2nd coat: Tint 3/4 of top coat color: S-W Industrial Enamel, B542
    a. BM Super Spec 100% Acrylic #274
    b. FC Interior Premium Eggshell Latex Enamel #370
3. 3rd coat: Top coat: S-W Industrial Enamel, B542
    a. BM Super Spec 100% Acrylic #274
    b. FC Interior Premium Eggshell Latex Enamel #370

K. Concrete Masonry Units, epoxy coating:
1. 1st coat, primer: White color: SS-W Multi-Purpose Zero VOC Interior/Exterior Latex Primer White, B51W00450
    a. BM Block Filler #M88
    b. FC Interior/Exterior Acrylic latex Masonry Block Filler #470A
    c. Required Coverage 50-100 sq. ft./gal., 16 mil. wet thickness, 8 mil. dry DFT
    d. Surfacer to be roller applied. DO NOT SPRAY APPLY.
2. 2nd coat: Tint 3/4 of top coat color: S-W Pro Industrial PreCatalyzed Waterbased Semi-Gloss Epoxy Extra White, K46W00151
    a. BM Super Spec 100% Acrylic #274
    b. FC Interior Premium Eggshell Latex Enamel #370
3. 3rd coat: Top coat: S-W Pro Industrial PreCatalyzed Waterbased Semi-Gloss Epoxy Extra White, K46W00151
    a. BM Super Spec 100% Acrylic #274
    b. FC Interior Premium Eggshell Latex Enamel #370

L. Sealed Concrete Floors: Refer to Section 03 3511 Concrete Floor Finishes

M. Exterior Pavement Markings:
1. 1st coat: S-W Setfast Premium Alkyd Zone Marking Paint
    a. FC Tuff-Boy Interior/Exterior Zone Marking Paint #1030 (White) / #1031 (Yellow)
2. 2nd coat: S-W Setfast Premium Alkyd Zone Marking Paint
    a. FC Tuff-Boy Interior/Exterior Zone Marking Paint #1030 (White) / #1031 (Yellow)

N. Fire Walls, Fire Barriers, Fire Partitions, Smoke Barriers, and Smoke Partitions:
1. Provide Stenciling with the following: "1 (2, 3, or 4 appropriately) HOUR RATED FIRE (AND/OR SMOKE) BARRIER - PROTECT ALL OPENINGS"
    a. Stenciling to be on wall in a concealed floor, floor-ceiling, or attic space.
    b. Stenciling to be located within 15 feet of the end of each wall and at intervals not to exceed 20'-0" measured horizontally along the wall or partition. Confer with Architect in field, regarding layout of stenciling and walls to be marked and/or identified.
    c. Stenciling shall be not less than 3" in height, with minimum 3/8" stroke.

d. Color to be contrasting with color of wall or partition stenciling is being applied to. Typical color is RED unless alternate color is required to achieve contrast. Confer with Architect for final color selecr

3.10 SCHEDULE - COLORS

A. Color selections and schedule to be provided by Architect after beginning of construction.

END OF SECTION

SECTION 10 1414
BUILDING PLAQUES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide one (1) cast plaque and related mounting hardware, to be installed Contractor.

B. Provide logo as shown on plaque drawing. Owner will provide a .jpg file of logo/mascot to Project Manager. Cost of any computer file conversions costs shall be paid by Contractor.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Submit scaled shop drawings showing fabrication method, finish, anchoring methods, layout, and installation method..

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Trumann School District's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.04 DELIVERY, STORAGE, AND PROTECTION

A. Deliver cast plaque to project site in original shipping packaging..

B. Store cast plaque under cover and elevated above grade.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for cast plaque and mounting hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. A.R.K. Ramos Architectural Signage System: www.arkramos.com

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CAST PLAQUE

A. A.R.K. Ramos Architectural Signage System: www.arkramos.com

B. Characteristics:
   1. Plaque Material: Bronze
   2. Plaque Size: 24 inches tall by 24 inches wide.
   3. Letter Style: Helvetica Medium.
   4. Border Style: Style No. 504.
   5. Background Texture: Leatherette.
   6. Plaque Finish: Style No. BR-400, Satin Bronze raised areas with dark oxidized background.
   7. Plaque Mounting: Concealed mounting for masonry.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cast plaque level, plumb, and at the height directed by Architect with surfaces free from distortion or other defects in appearances.

3.03 CLEANING

A. After installation, clean soiled cast plaque surfaces according to the manufacturer's instructions.

B. Protect installed cast plaque from damage until acceptance by the Owner.

3.04 SCHEDULES

A. Design and lettering for cast plaque to be provided by Architect.

END OF SECTION

SECTION 10 2114
TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Floor-mounted overhead-braced solid plastic (HDPE) toilet compartments, and urinal screens.

1.02 RELATED SECTIONS

A. Section 061000 - Rough Carpentry: Anchorage/blocking for attachment of partitions.

1.03 REFERENCES

A. ASTM A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Materials: Doors, panels and pilasters shall be constructed from High Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.

D. Performance Requirements:
   1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
      a. Class A flame spread/smoke developed rating, tested to ASTM E84.
   2. Material Fire Ratings:
      a. National Fire Protection Association (NFPA) 286: Pass.
      b. International Code Council (ICC): Class B.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Scranton Products, 801 E. Corey St.; Scranton, PA 18507; Toll Free Tel: 800-445-5148; Fax: 800-551-6993; Email:request info (info@scrantonproducts.com); Web:www.scrantonproducts.com
   1. Scranton Products; (www.scrantonproducts.com)
   2. Bobrick Washroom Equipment, Inc.: (www.bobrick.com)
   3. Bradley Corporation, (www.bradleycorp.com)

B. Substitutions: Not permitted.

2.02 FLOOR-MOUNTED OVERHEAD-BRACED SOLID PLASTIC TOILET COMPARTMENTS

A. Doors, panels, and pilasters shall be 1 inch (25 mm) thick with all edges rounded to a radius. Doors and dividing panels shall be 55 inches (1397 mm) high and mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.
   1. Aluminum heat sink fastened to bottom edges.
   2. Recycled content: Minimum 25 percent.

B. Pilasters shall be 82 inches (2083 mm) high fastened to floor.
   1. Pilaster sleeves shall be 3 inches (76 mm) high stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.

C. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design and integrated curtain track. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.

D. Wall Brackets: (height - 2 inches)
   1. Aluminum Brackets: Wall brackets shall be 54 inches (1372 mm) long made of heavy-duty aluminum (6463-T5 alloy) with a bright dip anodized finish and shall be fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Door Hardware:
   1. Wrap-Around Hinges: Hinges shall be 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum wrap-around hinges through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
   2. Door strike/keeper shall be 6 inches (152 mm) long and made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.

3. Latch and housing shall be made of heavy-duty extruded aluminum (6463-T5 alloy). The latch housing shall have a bright dip anodized finish, and the slide bolt and button shall have a black anodized finish.
4. Equip outswing handicapped doors with second door pull and door stop.

2.03 SOLID PLASTIC PRIVACY SCREENS

A. Provide solid plastic privacy screens at urinal.

B. Panels, and pilasters shall be 1 inch (25 mm) thick with all edges rounded to a radius. Screens shall be mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.
1. Aluminum heat sink fastened to bottom edges.
2. Recycled content: Minimum 25 percent.

C. Type: Pilaster Supported, Headrail Braced, Wall mounted screen:
1. Privacy urinal screens shall be 24 inches (457 mm) wide by 42 inches (1067 mm) high.

D. Wall brackets (similar to compartment wall brackets) shall be 41 inches (1372 mm) long made of heavy-duty aluminum (6463-T5 alloy) with a bright dip anodized finish, and shall be fastened to screen panels with stainless steel tamper resistant Torx head sex bolts.

PART 3 GENERAL

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings.

C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Accessories for toilet rooms, utility rooms, and other locations as shown on drawings.

C. Diaper changing stations.

D. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 06 1000: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.

B. Section 10 2110 - Toilet Compartments.

C. Section 22 4000 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

D. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011.

E. ASTM C1036 - Standard Specification for Flat Glass; 2011.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

G. GSA CID A-A-3002 - Mirrors, Glass; U.S. General Services Administration; 1996.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with the Owner for delivery of Owner provided toilet accessories for Contractor installation.

B. Coordinate the work with the placement of internal wall reinforcement, reinforcement of toilet partitions, and masonry cut-outs to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.06 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:
   1. Bobrick Washroom Accessories: www.bobrick.com
   2. Bradley Corporation: www.bradleycorp.com/#sle.

3. No Substitutions.

B. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

2.04 COMMERCIAL TOILET ACCESSORIES

A. As scheduled in the drawings.

B. Some items to be Owner Furnished, Contractor Installed (O.F.C.I.) as scheduled on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

C. Coordinate with Owner for templates and rough-in measurements for Owner furnished items.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

3.04 SCHEDULE

A. Refer to Toilet Accessories Schedule on the drawings

END OF SECTION

SECTION 10 4400
FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers:
   1. Provide nineteen (19) fire extinguishers with cabinets.
   2. Provide one (1) K-type Fire Extinguisher with wall hook in Kitchen

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

C. Conform to the requirements of the City of Arkansas Fire Department.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.06 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguisher Cabinets and Accessories:
   1. JL Industries, Inc: www.jlindustries.com.
      a. Fire Extinguisher: Cosmic 10E.
      b. Fire Extinguisher: Type K, in Kitchen.
      c. Cabinet: Fire Rated Semi-recessed, Ambassador 1016, white color.
         1) Contemporary V door, white color.
         2) 1/4" clear acrylic door glazing.
         3) Futura "FIRE HANDLE", Red color.
         4) Cabinet Signage: "FIRE EXTINGUISHER"
   2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, 24 inches from finished floor to bottom of wall opening..

C. Secure rigidly in place.

D. Carefully caulk around cabinet body without excessive width or smears.

E. Place extinguishers in cabinets.

3.03 SCHEDULES

A. Verify locations with Architect prior to installation.

END OF SECTION

SECTION 10 7500
FLAGPOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. One (1) Aluminum Flagpole.

B. Three (3) United States of America flags.

C. Three (3) Arkansas State Flags.

1.02 REFERENCE STANDARDS

A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains; 2014.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2012.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pole, accessories, and configurations.

C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed Arkansas.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

B. Protect flagpole and accessories from damage or moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flagpoles:
   1. American Flagpole: www.americanflagpole.com/#sle.
   2. Concord Industries, Inc: www.concordindustries.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FLAGPOLES

A. Flagpole: Aluminum:
   1. Manufacturer: AMERICAN FLAGPOLE: Product: Architectural Elite Series, #ESR25C61 (25'), heavy-duty, tapered aluminum pole (one required).
   2. Gold Anodized Aluminum Ball
   3. External halyard - single revolving truck assembly with aluminum pulley
   4. #10 (min) waterproof braided polypropylene halyard
   5. Neoprene snaphook covers
   6. 9" aluminum cleat WITH optional locking cleat cover
   7. Spun aluminum flash collar to match pole
   8. Galvanized corrugated steel ground sleeve with grounding spike

9. (One required) 25' height: 6" butt dia.,, wall thickness .156 inch, 3'-0" setting depth, 1-section, 145mph max. wind speed with flag, max. flag size 5' x 8'.

B. Flags:
   1. Provide: (3 required): United States of America Flag, 5' x 8' size.
   2. Provide: (3 required): Arkansas State Flag, 4' x 6' size.
   3. Flag Material: Annin's Nyl-Glo Nylon flag material
      a. Fast drying longest lasting nylon flag material available
      b. Flies in the lightest breeze
      c. Brass gromets with rope threaded canvas heading
      d. Large, full size "dense-filled-embroidered" stars
      e. Four rows of lock stiching with back-stitch reinforcements
      f. Two rows of stiching on top and bottom hems
      g. Best resistance to damaging ultraviolet radiation
      h. One year colorfast guarantee
      i. Dense 200 denier nylon weave

2.03 POLE MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M) , 6063 alloy , T6 temper.

2.04 ACCESSORIES

A. Finial Ball: Gold Anodized, standard size for specified pole.

B. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.

C. Cleats: 9 inch size, aluminum with galvanized steel fastenings.

D. Exterior Halyard: 5/16 inch diameter nylon, braided, with steel or bronze core., with (2) brass snap hooks
   1. Two (2) flags to be flown on single pole. Provide (4 total) (2) brass snap hooks for each flag.

2.05 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M 36M, corrugated 16 gage steel, galvanized, depth as indicated.

B. Pole Base Attachment: Flush; steel base with base cover.

C. Collar: fc-11 flash collar - color to match flagpole, sized minimum 1" larger than foundation sleeve.

D. Lightning Ground Cable: Copper No. 6 AWG, soft drawn.

2.06 FINISHING

A. Metal Surfaces in Contact With Concrete: Asphaltic paint.

B. Aluminum: Mill finish.

C. Finial: Gold anodized finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.02 PREPARATION

A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

A. Install flagpole , base assembly, and fittings in accordance with manufacturer's instructions.

B. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/2 inch.

3.05 ADJUSTING

A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION

SECTION 10 8101
HIGH SECURITY KEY BOX

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Recess Mounted, Plate Steel High Security Key Box.

1.02 SUBMITTALS

A. See Section 01 7800 - Closeout Submittals, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Knox-Box 3200 Series, recess mounted with hinged door.
   1. Description: Knox-Box recessed mount with hinged door. 1/4" plate steel housing, 1/2" thick steel door with interior gasket seal and stainless steel door hinge. Box and lock UL listed. Lock has 1/8" thick stainless steel dust cover with tamper seal mounting capability.
   2. Exterior Body Dimensions: 4" high x 5" wide s 3-3/4" deep.
   3. Recessed Mount Flange: 7" high x 7" wide.
   4. Lock: UL Listed. Double-action rotating tumblers and hardened steel pins accessed by a biased cut key.
   5. Finish: Knox-Coat proprietary finishing process.
   6. Color: Dark Bronze
   7. Capacity: Holds up to 10 keys and access cards in interior.

B. Substitutions: Not permitted.

2.02 ACCESSORIES

A. Recessed Mounting Kit

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 TOLERANCES

A. Maximum Variation From True Position: 1/32".

B. Maximum Offset From True Alignment: 1/32".

3.03 PROTECTION

A. Protect installed high security key box from subsequent construction operations.

END OF SECTION

SECTION 21 0500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Includes furnishing and installing all components of a wet pipe fire protection sprinkler system for the new building and new fire water service piping to a point of connection on the site as shown on Civil Utility Drawings. Building, to be sprinkled as required, by NFPA 13, State and Local Codes.

1.02 RELATED SECTIONS

A. Painting - Section 09 9000.

B. Mechanical Identification - Section 21 0553.

C. Fire Suppression Sprinkler Systems – Section 21 1300.

D. Earthwork – Section 31 2316.

1.03 REFERENCES

A. ANSI/NFPA 13 - 2002- Installation of Sprinkler Systems.

B. NFPA 101 - 2003 - Life Safety Code.

1.04 SUBMITTALS

A. See Section 01 3323 – Submittals, for Submittals Procedures.

B. Shop Drawings:
   1. Submit as a complete package to the Architect for review for the State Fire Marshal under a Memo of Understanding and record purposes:
      a. Layout drawing of entire overhead sprinkler system indicating relationship of all overhead items, including ceiling air diffusers. Any variation from designated sprinkler head locations shall be approved by the Architect. Location of risers, piping, etc. shall be as inconspicuous as possible, provide a pleasing appearance and still fulfill all functional requirements.
      b. Complete details and sections, as required to clearly define and clarify the design indicated, by the aforementioned layout.
      c. Designs requiring cutting of structural members for passage of sprinkler pipes or hangers shall be as noted on the drawings and as approved by the Structural Engineer.
      d. Catalog data of all system components (i.e. valves, siamese, alarms, heads, etc.
      e. All shop drawings, prior to being sent to the Architect, shall bear evidence of review by the Owner's insurance carrier. Insurance carrier review shall be by Owner's carrier at time immediately prior to shop drawing submission to Architect.
      f. Include working plans, summary sheets, detailed work sheet, and graph sheets according to NFPA 13 - 2002, 1-9, 7-3.2, 7-3.3, 7-3.4, 6.1, 6.2, and 6.3.

C. Maintenance Manuals:
   1. The contractor shall provide three (3) sets in hard back loose-leaf binders, of a compilation of catalog data of each manufactured item of equipment used in the fire protection system and shall present this compilation to the Architect for transmittal to the Owner before final payment is made. In each maintenance catalog shall be provided a complete set of submittals on all equipment, descriptive and installation data, operating instructions, parts lists and maintenance instructions.
   2. A complete double index shall be provided: (1) Listing of products alphabetically by name, and (2) listing the names of manufacturers of products alphabetically with their addresses and the address of the local sales representative.

1.05 QUALITY ASSURANCE

A. The system shall be designed and fabricated by a firm which is regularly engaged, for a minimum of five years, in manufacturing of fire protection piping systems similar to that required for this project.

B. At the option of the Contractor, the piping system may be hydraulically designed from the start of the sprinkler service in lieu of the standard pipe method.

C. All system designers, supervisors and installers shall have proper NICET certification.
   1. Prior to installation, submit data showing that Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.
   2. Qualifications of System Technician: Installation drawings, shop drawings and as-built drawings shall be prepared, by or under the supervision of an individual who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with a minimum Level III certification in the Fire Protection/Automatic Sprinkler System program. Contractor shall submit data for approval showing the name and certification of all involved individuals with such qualifications at or prior to submittal of drawings.

D. FM Labels: Provide fire protection products bearing FM approved labels.

E. UL Labels: Provide fire protection products which have been approved and labeled by UL.

F. Local Fire Department/Marshall Regulations: Comply with governing regulations pertaining to the fire protection system.

G. The entire installation shall be guaranteed for a period of one (1) year from the building acceptance date.

1.06 SITE INSPECTION

A. Examine premises and understand the conditions which may affect performance of work of this Division before submitting proposals for this work.

B. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

1.07 DRAWINGS

A. Mechanical drawings show general arrangement of piping ductwork, equipment, etc. Follow closely as actual building construction and work of other trades will permit.

B. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over mechanical drawings.

C. Because of the small scale of mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate structural and finish conditions affecting this work, and arrange work accordingly, providing such fittings, valves and accessories, required to meet conditions.

D. Record differences between mechanical works as installed and as shown in Contract Documents, on a set of prints of mechanical drawings to be furnished by Architect. Return these prints to Architect at completion of project. These will be labeled "Contractor Revised Drawings".

1.08 CODE REQUIREMENTS, FEES & PERMITS

A. Perform work in accordance with applicable provisions of state and local Plumbing Code, gas ordinances and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations and ordinances.

B. In case of differences between building codes, state laws, local ordinances, utility company regulations and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.

1.09 CONTRACTOR REVISED DRAWINGS

A. The contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.

B. Exact location of all underground utility service entrances and their connections to utility mains, well heads, loop piping and all valves, etc., which will be concealed in the finished work shall be accurately indicated on the drawings by measured distances.

C. Upon completion of the work and prior to final payment, the contractor shall furnish to the Architect, one set of "contractor revised" prints, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the contract drawings.

D. Contractor shall include all addendum items and field change order information on the revised drawings. Revise all schedules shown on the drawings to reflect the actual model numbers, capacities and electrical characteristics of substituted equipment.

1.10 VISIT SITE

A. This contractor shall visit the site of the building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions and operations. Failure on his part to do this will not be cause for extras after the contract is signed by reason of unforeseen conditions. Any existing electric wiring and conduit, gas, water drainage piping encountered within the building area shall be relocated or removed where required by this contractor at no extra cost to the Owner.

1.11 GUARANTEE

A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or in the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.

B. The Contractor shall, after completion of the original test of the installation, and acceptance of the Architect, provide any service incidental to the proper performance of the mechanical systems under guarantees outlined above for a period of one (1) year.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Fire protection piping in the ground shall be U.S. Pipe "Tyton", or approved equal, Class 50 ductile iron waterworks pipe, conforming to ANSI/AWWA C151 A21.51, cement lined, seal coated conforming to ANSI/AWWA C151 A21.4, bell and spigot type, cast in lengths not less than twelve (12) feet, exclusive of socket. Specials and fittings for pipe shall be gray iron or ductile iron with minimum pressure rating of 250 psi, conforming to the latest standard specifications of the ANSI/AWWA and shall conform in pattern, dimensions, coating and lining with the pipe furnished. Wherever special fittings or special conditions require flanges or other type of joints, the pipe and fittings shall conform to these specifications and the flanges shall be faced and drilled American Standard. All joining materials shall be of a type, make and quality approved by the Architect and shall conform to the following requirements:

1. Bell and Spigot Joints - Joints shall be with rubber rings to manufacturer's recommendations.
2. Bolted Joints - Material for bolted joints shall consist of bolts, nuts, washers and gaskets of a type and size to conform to the recommendations of the pipe manufacturer.

B. Fire protection piping above grade, inside building, shall be black schedule 40 steel pipe for mains and black schedule 10 steel pipe for run outs. Fittings, generally, shall be UL approved, Victaulic pipe fittings and Victaulic Style 77 couplings on 3 inches and larger sizes. Where a rigid coupling is required use Victaulic Style 07. All fittings and couplings shall be screwed for pipe 2½" or smaller. All Victaulic Style 77 couplings shall have housing fabricated in two or more malleable iron castings; coupling gasket shall be Victaulic Grade "E" molded synthetic rubber; coupling bolts shall be oval neck track head type. Victaulic fittings shall be fabricated of malleable iron casting in accordance with ASTM A-47.

C. Pipe and tubing exceptions of NFPA 13, 2-3.5 and 2-4.2 shall not be accepted in the fire protection system.

2.02 SUPPORTS, ANCHORS AND SEALS

A. Requirements for fire protection system shall comply with requirements under Section 21 0548.

2.03 VALVES

A. Fire protection system gate valves 2 inches and smaller shall be UL/FM approved, Class 200, solid wedge disc, OS&Y pattern, yoke bonnet, threaded, best grade brass; Stockham No. B-33, Kennedy Fig. 65, or Milwaukee No. BB-SCS. Gate valves 2-1/2 inches and larger shall be UL/FM approved, Class 200, solid wedge disc, OS&Y pattern, cast iron body and bonnet, bronze trim, flanged injection type stuffing box, Stockham No. G-634, Kennedy Fig. 68, or Mueller No. A-2073-6.

B. Fire protection system check valves 2-1/2 inches and smaller shall be Stockham No. B-319, Milwaukee No. 509, or Hammond No. 1B904. Check valves 3 inches and larger shall be UL.FM approved, swing check, bolted cap, high strength cast iron body and cap, bronze trim flanges, Stockham No. G-939, or Kennedy No. 126.

C. Alarm check valve shall be Viking Model "G-1", Reliable Model E, or approved equal. The valve shall be equipped to give signal upon operation and be provided with standard trimmings, including pressure gage, retarding chamber, testing by-pass, and necessary pipe fittings and accessories required for complete installation. Retarding chamber to be provided with closed system, with suitable drain outside.

2.04 WATER FLOW INDICATORS AND ALARMS

A. Provide in the Fire Protection System Potter-Roemer, Inc. Fig. #6220 tamper switch on stop valves; fig. #6240 pressure gauge, water motor alarm with drain, and #6201-6208 water flow indicator. The wiring of the alarm and connection to the fire alarm system shall be by electrical contractor.

2.05 BACKFLOW PREVENTER

A. Furnish and install where shown on the drawings Watts Regulator Company or Architect approved equal, double check detector assembly backflow preventer, equipped with cubic feet per minute, 5/8 inch by 3/4-inch meter and ball type test cocks, UL listed resilient seated OS&Y shut-off valves.

B. Unit shall have epoxy coated cast iron body construction, bronze seat and disc holder, stainless steel trim and durable, tight-seating rubber check valve discs, bronze body ball type test cocks and Record-all 3/4-inch bronze meter, Model 25.

C. Unit shall be suitable for supply pressure up to 175 psi and water temperatures to 110 degrees F, tested and certified under ASSE No. 1015-1980, AWWA C506-78, UL and FM Standards, and accepted by the Arkansas State Plumbing Code.

2.06 ORIGIN

A. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 All joining materials for ductile iron pipe shall be of a type, a make and quality approved by the Architect and shall conform to the following requirements:

A. Material for bolted joints shall consist of bolts, nuts, washers and gaskets of a type and size to conform to the recommendations of the pipe manufacturers.

B. Polyethylene material in the form of flat sheet or rolls shall be placed around all mechanical joints of pipe and fittings; all valves and fire hydrants with mechanical joint ends and all saddles, sleeves, couplings, tapping saddles and any other appurtenances with exposed bolts. It is not the intent that the material forms an enclosure that is absolutely air or water tight, but to prevent pipe to soil contact.
   1. The sheet shall be passed under the appurtenances and brought up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Tape the polyethylene securely in place at valve stem, and other penetrations.
   2. Openings for branches, service taps, blow-offs, air valves, and similar appurtenances shall be made by making an X-shaped cut in the polyethylene and temporarily folding the film back. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut, as well as any other damaged areas in the polyethylene with tape.
   3. Where polyethylene wrapped pipe joints a pipe which is not wrapped, extend the polyethylene tube to cover the unwrapped pipe a distance of at least 2 feet and secure the end.
   4. Appurtenances by at least three (3) circumferential wraps of tape.
   5. Polyethylene material shall be stored on the job site in such manner that it is not exposed to direct sunlight. Exposure during installation shall not exceed 48 hours.
   6. Backfill material shall be the same as specified for pipe without polyethylene wrapping. Special care shall be taken to prevent damage to the polyethylene wrapping when placing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, stones, and/or other material that could damage polyethylene.

3.02 Prior to connecting to the overhead piping, the underground main should be flushed in the presence of a representative of the Owner and meet with his approval.

3.03 Piping in the areas having ceiling shall be concealed. Where ceilings have grids, sprinkler heads shall be centered with the grid. Piping in other areas may be exposed, but kept at a minimum distance from structural system. All piping shall be free of rust, clean and have a minimum of one (1) shop coat of clear rust inhibiting paint or a color as selected by Architect.

3.04 Valves shall be complete with all necessary items, fittings, identification tags or plates, and accessories, including water motor gong. Design shall allow for suitable drainage of same.

3.05 Where piping passes through walls, floors, ceilings or other building construction, sleeves must be used. Where exposed piping passes through finish work escutcheons shall be chrome plated or other finish acceptable to the Architect. Split wall plates or escutcheons shall be installed to fit snugly around piping. Where finish is not a problem, suitable plates shall be provided at each hole to assure effectiveness of construction as a fire stop.

3.06 Before assembly of couplings, lightly coat pipe ends and outside of gaskets with cup grease or graphite paste.

3.07 Pipe grooving shall be in accordance with the manufacturer's specifications contained in latest published literature.

3.08 S&Y valves, where shown on the drawings, shall be electrically supervised with tamper switch wired to alarm bell at central panel. Coordinate wiring with valve and controls.

3.09 All openings for piping should be anticipated and indicated on the approved and accepted shop drawings. Any additional cutting of openings must have the written approval of the Architect.

3.10 After completion of all installations, tests, etc., and prior to the building opening date, the fire protection contractor shall instruct the Owner in the operation of the fire protection system. Special care shall be taken to make sure the Owner:

A. Will immediately recognize whether the main valve is in an open or closed position.

B. Will know how to drain the system.

C. Will know how to test the alarm valve.

D. Will know how to reset all systems and how they are interconnected.

3.11 Testing of the fire protection system shall be as outlined in hereinbefore-listed NFPA Standards.

END OF SECTION

SECTION 21 0501
FIRE SUPPRESSION SYSTEM DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of general demolition work is shown on drawings. Coordinate the required fire suppression system with the general demolition. The existing fire suppression system shall be kept active for the duration of the project, except for required system shutdowns as required. Shutdowns shall be kept to a minimum and the system shall be restored after the shutdown work is complete.

B. Demolition includes removal of systems and removal and disposal of demolished materials, as shown on drawings and herein specified.

C. The Owner shall have the option of retaining any items removed. The Contractor shall deliver these items to the Owner's designated storage area. Any items not retained by the Owner shall be disposed of off-site by the Contractor.

1.03 JOB CONDITIONS

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.
   1. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The contractor shall visit the site and determine the actual conditions prior to bidding.

B. Partial Removal: Items of salvable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.
   1. Storage or sale or removed items on site will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

D. Protections; Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
   1. Install temporary mechanical services, plumbing, temperature control, etc., as required by the Owner or authorities having jurisdiction.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

F. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with Owner at least 24 hours in advance.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
2. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

G. If Contractor is required to disconnect utility services or other services to an occupied area, the Contractor shall provide temporary or alternative service to that area, as required by Owner.

PART 2 PRODUCTS

(Not applicable)

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove all equipment, piping, etc., as indicated on the drawings.

B. All items shown to remain active shall be furnished with necessary devices or accessories.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.
1. Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:
1. Transport materials removed from demolished structures and dispose of off site.

END OF SECTION

SECTION 21 0529
HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and equipment hangers and supports.

B. Equipment bases and supports.

C. Sleeves and seals.

D. Flashing and sealing equipment and pipe stacks.

1.02 RELATED SECTIONS

A. Section 03 3000 - Cast-In-Place Concrete: Equipment bases.

1.03 REFERENCES

A. ASME B31.2 - Fuel Gas Piping

B. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

1.04 SUBMITTALS

A. Submit under provisions of Section 21 0500 and Section 01 3300.

B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Sprinkler Piping:
   1. Conform to ASME B31.9 and ASTM F708.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   6. Wall Support for Pipe: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.
   8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.02 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.03 FLASHING

A. Metal Flashing: 28 gage 304 stainless steel.

B. Copper Flashing: 16 oz./sq. ft.

C. Lead Flashing:
   1. Waterproofing: 6 lb/sq ft.

D. Caps: Steel, 22-gauge minimum; 16-gauge at fire resistant elements.

2.04 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18-gauge galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe.

C Sleeves for Ductwork and Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Galvanized steel.

E. Sleeves for Rectangular Ductwork: Galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as scheduled.

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.03 EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, where indicated on Drawings, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 3000. Coordinate exact size requirement for pads.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.04 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 4 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and calk, metal counter-flash, and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor drains watertight to adjacent materials.

E. Adjust storm collars tight to pipe with bolts; calk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.05 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves.

D. Where piping or ductwork penetrates fire or smoke rated floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and calk. Provide close fitting metal collar or escutcheon covers at both sides of penetration. Secure collar or escutcheon to prevent blow-out. Fire stopping materials shall meet requirements of ASTM E119.

E. Install chrome plated steel escutcheons at finished surfaces.

3.06 SCHEDULES

HANGER ROD

PIPE SIZE Inches	MAX. HANGER SPACING Feet	DIAMETER Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8

END OF SECTION

SECTION 21 0548
VIBRATION AND SEISMIC CONTROL FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Includes furnishing and installing vibration and seismic components of a wet pipe fire protection sprinkler system, for the entire building.

B. Provide seismic protection restraints and install piping system in accordance with the requirements set forth in NFPA 13.

C. This facility is located in Arkansas, and the fire protection systems shall be designed and installed in accordance with NFPA 13, 2021 Arkansas Fire Prevention Code, ASCE 7-05, minimum design loads for buildings and other structures, Chapter 13, state and structural drawings and notes for applicable seismic design criteria. The Building Design Category is "D".

1.02 RELATED SECTIONS

A. Painting - Section 09 90 00.

B. Common Work Results for Fire Suppression – Section 21 0500.

C. Mechanical Identification - Section 21 0553.

D. Fire Suppression Sprinkler Systems – Section 21 1300.

1.03 REFERENCES

A. ANSI/NFPA 13 & Ark State Fire Code- (latest accepted edition) - Installation of Sprinkler Systems.

B. NFPA 101 & Ark State Fire Code- (latest accepted edition) - Life Safety Code.

1.04 SUBMITTALS

A. See Section 01 3300 – Submittals, for Submittals Procedures.

B. The manufacturer of vibration isolation and seismic restraints shall provide submittals for products as follows:
   1. Descriptive Data:
      a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
      b. Detailed schedules of flexible and rigidly mounted equipment, showing vibration isolators and seismic restraints by referencing numbered descriptive drawings.
   2. Shop Drawings:
      a. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
      b. Provide all details of suspension and support for ceiling suspended equipment.
      c. Where walls, floors, slabs or supplementary steel work are used for

seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.

d. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

3. Seismic Certification and Analysis:

a. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.

b. All restraining devices shall have a preapproval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations. Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45° to the weakest mode.

c. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in section 1.06 acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

C. Typical Applicable Codes and Standards:

1. The seismic protection shall be provided as required by chapter 16 of the Arkansas Fire Code (International Building Code) Volume II. This building shall meet design classification "C" requirements.

1.05 QUALITY ASSURANCE

A. The vibration and seismic control system shall be designed and fabricated by a firm which is regularly engaged, for a minimum of five years, in designing of piping systems similar to that required for this project.

B. All system designers, supervisors and installers shall comply with the following.

1. Prior to installation, submit data showing that Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

2. Qualifications of System Technician: Installation drawings, shop drawings and as-built drawings shall be prepared, by or under the supervision of an individual who is experienced with the types of works specified herein.

C. FM Compliance: Comply with Factory Mutual "Approved Guide".

D. UL Labels: Provide fire protection support products which have been approved and labeled by UL.

E. The entire installation shall be guaranteed for a period of one (1) year from the building acceptance date.

1.06 SEISMIC FORCE LEVELS

A. The following force levels will be used on this project.
MINIMUM F_p (G's) FORCES EQUAL TO OR EXCEEDING BUILDING CODE LIST IN 1.03.

IBC-2000 TI-809-04	IBC-2003 NFPA-5000	"G" Forces for High Deformability Pipe, Bus Ducts, Conduits & Cabletrays a_p*=1.0, R_p*=3.5	"G" Forces for Rigidly Mounted Equipment & Limited Deformability Pipe a_p*=1.0, R_p*=2.5	"G" Forces for Vibration Isolated Equipment & Pipe Pressure Vessels a_p*=2.5, R_p*=2.5	"G" Forces for Low Deformability Pipe a_p*=1.0, R_p*=1.25
Ss = 0.616		Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.
Lower Levels and Ground Level		0.22 0.15	0.22 0.15	0.29 0.15	0.23 0.15
Above Ground Level up to 1/4 of the Height of the Building		0.22 0.15	0.22 0.15	0.44 0.15	0.35 0.15
Above 1/4 up to 1/2 of the Height of the Building		0.22 0.15	0.23 0.15	0.58 0.15	0.47 0.15
Above 1/2 up to 3/4 of the Height of the Building		0.22 0.15	0.29 0.15	0.73 0.15	0.58 0.15
Above 3/4 of the Height of the Building up to the Roof		0.25 0.15	0.35 0.15	0.88 0.15	0.7 0.15

PART 2 PRODUCTS

2.01 INTENT

A. All vibration isolators and seismic restraints described in this section shall be the product of a single manufacturer. Mason Industries' products are the basis of these specifications; products of other manufacturers are acceptable provided their systems strictly comply with the specification and have the approval of the specifying engineer. Submittals and certification sheets shall be in accordance with section 1.04.

B. For the purposes of this project, failure is defined as the discontinuance of any

attachment point between equipment or structure, vertical permanent deformation greater than 1/8" (3mm) and/or horizontal permanent deformation greater that 1/4" (6mm).

2.02 PRODUCT DESCRIPTIONS

A. Vibration Isolators and Seismic Restraints.

SPECIFICATION:

1. Hangers shall consist of rigid steel frames containing minimum 1 1/4" (32mm) thick neoprene elements at the top and a steel spring with general characteristics as in specification 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30deg. arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30 deg. capability. Hangers shall be type 30N as manufactured by Mason Industries, Inc.
2. Hangers shall be as described in 10, but they shall be precompressed and locked at the rated deflection by means of a resilient seismic upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30 deg. capability. Hangers shall be type PC30N as manufactured by Mason Industries, Inc.
3. Seismic Cable Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cables must be prestretched to achieve a certified minimum modulus of elasticity. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges. Cable assemblies shall have an Anchorage Preapproval "R" Number from OSHPD in the State of California verifying the maximum certified load ratings. Cable assemblies shall be type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and the clevis or SCBV if clamped to a beam, all as manufactured by Mason Industries, Inc.
4. Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Seismic solid brace assembly shall have anchorage preapproval "R" number from OSHPD in the state of California verifying the maximum certified load ratings. Solid seismic brace assemblies shall be type SSB, SSBS or SSRF as manufactured by Mason Industries, Inc.
   Note: Specifications 12 - 14 apply to trapeze as well as clevis hanger locations. At trapeze anchor locations piping must be shackled to the trapeze. Specifications apply to hanging equipment as well.
5. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall have an Anchorage Preapproval "R" Number from OSHPD in the State of California. Rod clamp assemblies shall be type SRC or UC as manufactured by

Mason Industries, Inc.

6. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross braces shall have an Anchorage Preapproval "R" Number from OSHPD in the State of California. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.
7. All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4" (6mm) thick. Rated loadings shall not exceed 1000 psi (.7kg/mm^2). A minimum air gap of 1/8" (3mm) shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to ensure no short circuits exist before systems are activated. Snubbers shall have an Anchorage Preapproval "R" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Snubber shall be type Z-1225 as manufactured by Mason Industries, Inc.
8. All directional seismic snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum of 3/4" (19mm) thick. Rated loadings shall not exceed 1000 psi (.7kg/mm^2). Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" (3mm) nor more that 1/4"(6mm). Snubbers shall be installed with factory set clearances. The capacity of the seismic snubber at 3/8" (9mm) deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable" G" force. Submittals shall include the load deflection curves up to 1/2" (12mm) deflection in the x, y and z planes. Snubbers shall have an anchorage preapproval "R" number from OSHPD in the state of California verifying the maximum certified horizontal and vertical load ratings. Snubbers shall be type Z-1011 as manufactured by Mason Industries, Inc.
9. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads. Drill-in stud wedge anchors shall be type SAS as manufactured by Mason Industries, Inc.
10. All-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by a minimum 1/2" (12mm) thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi (.35 kg/mm^2) and the design shall be balanced for equal resistance in any direction. All-directional anchors shall be type ADA as manufactured by Mason Industries, Inc.
11. Split Wall Seals consist of two bolted pipe halves with minimum 3/4" (19mm) thick neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1" (25mm) past either face of the wall. Where temperatures exceed 240deg. F, 10# (4.5kg) density fiberglass may be used in lieu of the sponge. Seals shall be type SWS as manufactured by Mason Industries, Inc.

12. The horizontal thrust restraint shall consist of a spring element in series with a neoprene molded cup as described in specification 5 with the same deflection as specified for the mountings or hangers. The spring element shall be designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" (6mm) movement at start and stop. The assembly shall be furnished with 1 rod and angle brackets for attachment to both the equipment and the ductwork or the equipment and the structure. Horizontal restraints shall be attached at the centerline of thrust and symmetrical on either side of the unit. Horizontal thrust restraints shall be type WBI/WBD as manufactured by Mason Industries, Inc.

PART 3 EXECUTION

3.01 GENERAL

A. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data.

B. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. The contractor shall not install any equipment or piping, which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.

E. Coordinate work with other trades to avoid rigid contact with the building.

F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractors expense.

G. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractors expense.

H. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractors expense.

I. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
   1. Flanges of structural beams.
   2. Upper truss cords in bar joist construction.
   3. Cast in place inserts or wedge type drill-in concrete anchors.

J. Specification 2 cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

K. Specification 2 cable assemblies are installed taut on non-isolated systems. Specification 3

seismic solid braces may be used in place of cables on rigidly attached systems only.

L. At locations where specification 2 or 3 restraints are located, the support rods must be braced when necessary to accept compressive loads with specification 4 braces.

M. At locations where specification 2 cable restraints are installed on support rods with spring isolators, the spring isolation hangers must be specification type 1.

N. At all locations where specification 2 or 3 restraints are attached to pipe clevis, the clevis cross bolt must be reinforced with specification type 5 braces.

O. Drill-in concrete anchors for ceiling and wall installation shall be specification type 18, and specification type 9 female wedge type for floor mounted equipment.

P. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project.

Q. Where piping passes through walls, floors or ceilings the vibration isolation manufacturer shall provide specification 12 wall seals.

R. All fire protection piping shall be braced in accordance with NFPA 13 and 14.

S. All fire protection equipment is considered life safety equipment and shall be seismically restrained using the seismic force levels for life safety equipment in table 1.06-1, if higher levels are shown.

3.02 VIBRATION ISOLATION OF PIPING

A. Horizontal pipe isolation: The first four pipe hangers in the main lines near the mechanical equipment shall be as described in specification 11. Brace hanger rods with SRC clamps specification 14. Horizontal runs in all other locations throughout the building shall be isolated by hangers as described in specification 10 & 10A. Floor supported piping shall rest on isolators as described in specification 6. Heat exchangers and expansion tanks are considered part of the piping run. The first three isolators from the isolated equipment will have the same static deflection as specified for the mountings under the connected equipment. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75" (19mm) deflection for pipe sizes up to and including 3" (75mm), 1 1/2" (38mm) deflection for pipe sizes up to and including 6" (150mm), and 2 1/2" (64mm) deflection thereafter. Hangers shall be located as close to the overhead structure as practical. Hanger locations that also have seismic restraints attached must have type RW Rebound Washers to limit uplift. Where piping connects to mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.

B. Riser isolation: Risers shall be suspended from specification 10A hangers or supported by specification 5 mountings, anchored with specification 10 anchors, and guided with specification 11 sliding guides. Steel springs shall be a minimum of 0.75" (19mm) except in those expansion locations where additional deflection is required to limit load changes to +/- 25% of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.

C. Seismic Restraint of Piping

1. Seismically restrain all piping listed as a, b or c below. Use specification 2 cables if isolated. Specification 2 or 3 restraints may be used on unisolated piping.
   a. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1 1/4" (32mm) I.D. and larger.
   b. All other piping 2 1/2" (64mm) diameter and larger.
2. Transverse piping restraints shall be at 40' (12m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
3. Longitudinal restraints shall be at 80' (24m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
5. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" (600m) of the elbow or TEE or combined stresses are within allowable limits at longer distances.
6. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
7. Branch lines may not be used to restrain main lines.
8. Connection to the structure must be made with a non-friction connection (i.e. no "C" clamps)
9. Hanger locations that also have seismic restraints attached must have Specification 10A type RW Rebound Washers.

END OF SECTION

SECTION 21 0553
IDENTIFICATION FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Includes identification of all components of a wet pipe fire protection sprinkler system, for the entire building.

1.02 RELATED SECTIONS

A. Painting - Section 09 9000.

B. Common Work Results for Fire Suppression – Section 21 0500.

C. Fire Suppression Sprinkler Systems – Section 21 1300.

1.03 REFERENCES

A. ANSI/NFPA 13 & Ark State Fire Code - (latest accepted edition) - Installation of Sprinkler Systems.

B. NFPA 101 & Ark State Fire Code - (latest accepted edition) - Life Safety Code.

1.04 SUBMITTALS

A. See Section 01 3300 – Submittals, for Submittals Procedures.

B. Product Data: Submit product specifications and installation instructions for each identification material and device desired.

C. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

D. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in margin of schedule. In addition to mounted copies, furnish extra copies for Maintenance Manuals as specified in Division 1.

1.05 QUALITY ASSURANCE

A. The system shall be designed and fabricated by a firm which is regularly engaged, for a minimum of five years, in manufacturing of fire protection piping systems identification.

PART 2 PRODUCTS

2.01 MECHANICAL IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-21 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

B. Plastic Pipe Markers:
   1. General: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent, color-coded, plastic-sheet pipe markers, complying with ANSI A13.1.
      a. Small Pipes: For external diameters less than 6 inches (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
         (1) Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
         (2) Adhesive lap joint in pipe marker overlap.
         (3) Laminated or bonded application of pipe marker to pipe (or insulation).
      b. Large Pipes: For external diameters of 6 inches and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:
         (1) Laminated or bonded application of pipe marker to pipe (or insulation)
         (2) Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless-steel bands.
      c. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with names as shown or specified.
      d. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.
      e. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

C. Valve Tags:
   1. At the Contractor's option, provide one of the following:
      a. Brass Valve Tags: provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in 1/4-inch-high letters and sequenced valve numbers 1/2 inch high, and with 5/32-inch hole for fastener. Provide 1-1/2-inch diameter tags, except as otherwise indicated.
      b. Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32-inch-thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4-inch-high letters and sequenced valve numbers 1/2 inch high, and with 5/32-inch hole for fastener. Provide 1-1/2-inch square black tags with white lettering, except as otherwise indicated.
   2. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

D. Valve Schedule Frames:
   1. General: For each page of the valve schedule, provide a glazed display frame, with screws for removable mounting on walls. Provide frames of rigid plastic or metal, with plastic glazing.

E. Engraved Plastic-Laminate Signs:
   1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
   2. Thickness: 1/16 inch for units up to 20 square inches or 8-inch length; 1/8 inch for larger units.
   3. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering plastic pipe markers which may be incorporated in the work include, but are not limited to, the following:
Seton Name Plate Company
EMED Co., Inc.
Approved equal.

2.02 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/ maintenance of mechanical systems and equipment.

B. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:
   1. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Piping System Identification:
   1. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces, (shafts, tunnels, plenums), exterior non-concealed locations and above removable acoustical ceilings.
      a. Near each valve and control device.
      b. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

c. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
d. At access doors, manholes and similar access points which permit view of concealed piping.
e. Near major equipment items and other points of origination and termination.
f. Spaced intermittently at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
g. On piping above removable acoustical ceilings.

C. Valve Identification:
1. General: Provide valve tag on every valve, cock and control device in each piping system.
2. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.
a. Where more than one major machine room is shown for project, install mounted valve schedule in each major machine room, and repeat only main valves which are to be operated in conjunction with operations of more than single machine room.

D. Lettering Size: Minimum 3/8-inch-high lettering for name of unity where viewing distance is less than 2'-0"; 3/4 inch high for distances up to 6'-0"; and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 the size of principal lettering.

E. Text of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, and warn of hazards and improper operations.

END OF SECTION

SECTION 21 1300
FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Includes furnishing and installing all components of a pre-action fire protection sprinkler system for the building.

1.02 RELATED SECTIONS

A. Painting - Section 09 91 00.

B. Common Work for Fire Suppression Sprinkler Systems – Section 21 05 00.

C. Mechanical Identification - Section 21 05 53.

D. Fire Suppression Standpipes – Section 21 12 00.

E. Fire Suppression Sprinkler Systems – Section 21 13 00.

1.03 REFERENCES

A. ANSI/NFPA 13 - Installation of Sprinkler Systems.

B. ANSI/NFPA 14 - Installation of Standpipe and Hose Systems.

C. NFPA 101 - Life Safety Code.

1.04 SUBMITTALS

A. See Section 01 3323 – Submittals, for Submittals Procedures.

B. Shop Drawings:
   1. Submit as a complete package to the Architect for review for the State Fire Marshal under a Memo of Understanding and record purposes:
      a. Layout drawing of complete overhead sprinkler system indicating relationship of all overhead items, including ceiling air diffusers. Any variation from designated sprinkler head locations shall be approved by the Architect. Location of risers, piping, etc. shall be as inconspicuous as possible, provide a pleasing appearance and still fulfill all functional requirements.
      b. Complete details and sections as required to clearly define and clarify the design indicated by the aforementioned layout.
      c. Designs requiring cutting of structural members for passage of sprinkler pipes or hangers shall be as noted on the drawings and as approved by the Structural Engineer.
      d. Catalog data of all system components (i.e. valves, siamese, alarms, heads, etc.

e. All shop drawings, prior to being sent to the Architect, shall bear evidence of review by the Owner's insurance carrier. Insurance carrier review shall be by Owner's carrier at time immediately prior to shop drawing submission to Architect.

f. Include working plans, summary sheets, detailed work sheet, and graph sheets according to NFPA, 1-9, 7-3.2, 7-3.3, 7-3.4, 6.1, 6.2, and 6.3.

C. Maintenance Manuals:

1. The contractor shall provide three (3) sets in hard back looseleaf binders of a compilation of catalog data of each manufactured item of equipment used in the fire protection system and shall present this compilation to the Architect for transmittal to the Owner before final payment is made. In each maintenance catalog shall be provided a complete set of submittals on all equipment, descriptive data, installation data, operating instructions, parts lists and maintenance instructions.

2. A complete double index shall be provided: (1) Listing of products alphabetically by name, and (2) listing the names of manufacturers of products alphabetically with their addresses and the address of the local sales representative.

1.05 QUALITY ASSURANCE

A. The system shall be designed and fabricated by a firm which is regularly engaged in manufacturing of fire protection piping systems similar to that required for this project.

B. At the option of the Contractor, the piping system may be hydraulically designed from the start of the sprinkler service in lieu of the standard pipe method.

C. All system designers, supervisors and installers shall have proper NICET certification.

D. FM Compliance: Comply with Factory Mutual "Approved Guide".

E. FM Labels: Provide fire protection products bearing FM approved labels.

F. UL Labels: Provide fire protection products which have been approved and labeled by UL.

G. Local Fire Department/Marshall Regulations: Comply with governing regulations pertaining to the fire protection system.

H. After completion of the installation, the entire system shall be tested for acceptance by the Insurance Service Organization according to the rules and regulations of for the State of Arkansas.

I. The Insurance Service Organization, after reviewing the installation will issue a letter of final rating addressed to the fire protection company responsible for the installation, prepared in triplicate and given to the Owner for distribution. All costs for this service shall be borne by the fire protection contractor.

J. The entire installation shall be guaranteed for a period of one (1) year from the substantial completion date.

PART 2 PRODUCTS

2.01 SPRINKLER HEADS

A. System shall include, but not be limited to: sprinkler heads (pendant), (upright), (sidewall),

(recessed), (concealed) dry sidewall, spare sprinkler head box, wrenches, pressure gauge, 2-inch main drain and inspector's test line with stop valve.

B. Furnish Owner a stock of six (6) spare sprinkler heads of each type and temperature rating used on the property with special sprinkler wrench for each type used. Install a separate spare sprinkler head box near each of the two fir services.

C. Suspended Ceiling:
   1. Type: Recessed pendant type with matching push on escutcheon plate.
   2. Head Finish: Verify with Architect.
   3. Escutcheon Plate Finish: Verify with Architect.
   4. Glass bulb type, temperature rated for specific area hazard (155°F – typical most areas).
   5. Model: FIFR quick response, manufactured by Reliable.

D. Exposed Area Type:
   1. Type: Standard upright type (and pendant).
   2. Head Finish: (Brass for Mechanical/Electrical Room, Storage Room, etc.) Black plated for finished areas without ceiling.
   3. Glass bulb type, temperature rated for specific area hazard. 155°F typical most areas. 200°F for Mechanical/Electrical Rooms. 200°F or 286°F for Elevator shaft.
   4. Model: FIFR quick response, manufactured by Reliable.

E. Furnish Reliable dry sidewall heads where shown on Drawings – verify finish with Architect.

F. Furnish Reliable concealed heads where shown on Drawings – verify finish with Architect.

G. This facility is located at Little Rock, Arkansas in Pulaski County, and the piping restraint systems shall be designed to comply the most current Arkansas Fire Prevention Code, for the specific seismic design category of project.

2.02 WATER FLOW INDICATORS AND ALARMS

A. Provide in the Fire Protection System Potter-Roemer, Inc. Fig. #6220 tamper switch on stop valves; fig. #6240 pressure gauge, #6230 alarm bell, #6235 bell guard. and #6201-6208 water flow indicator. The wiring of the alarm and connection to the fire alarm system shall be by electrical contractor.

2.03 POST INDICATOR VALVE

A. Post indicator type gate valve shall be Mueller Company Series A-2052-20, or approved equal, for service connection as required. Indicator post shall be Mueller Company Series A-20805, of approved length and size as required. All exterior portions of the indictor post shall be of a red painted finish. Valve shall be provided with tamper switch wired by the electrical contractor. Post indicator valve shall be installed 40 feet from the building. (Refer to plans for exact location).

2.04 FIRE PUMP SYSTEM

The pump, driver, controller and accessories shall be purchased under unit contract stipulating compliance with the latest edition of NFPA 20. The pump manufacturer shall be responsible for proper operation of the unit assembly, as indicated by field test.

A. Fire Pump

The vertical inline fire pump shall have a rated capacity of 500 gpm at a total head rating of 40 psig. At 150% of the rated capacity it shall develop at least 65% of its rated head, and shall not exceed 140% of the rated head at zero capacity. The fire pump shall be approved by Factory Mutual and listed by Underwriters Laboratories. The fire pump shall be ITT/AC model 6X4X12F.

B. Electric Driver

The motor shall be a maximum of 2 hp, 3 phase, 60 Hz, 208volts. The motor speed shall be 1785 rpm. It shall comply with the provisions of NFPA 70, National Electric Code as described in NFPA 20.

C. Fire Pump Controller

The motor controller shall be listed by Underwriters Laboratories and approved by Factory Mutual for fire pump service. It shall be compatible with the motor horsepower and voltage. It shall be the soft start type. The control shall be completely assembled, wired and factory tested by its manufacturer. The controller shall be Cutler Hammer.

An LCD display, visible through a shatterproof glass panel in the door, shall indicate the following: system pressure, three phase voltage and amperes, weekly test time, elapsed run time, number of operations and the most recent 2,048 alarm and operational events.

Green LED's shall display the following starting and running conditions: power on, pump running, RPT timing, sequence timer, local start, remote start, deluge valve, interlock on, and low pressure.

Red LED's shall display the following alarm conditions: phase reversal, phase failure, fail to start, undervoltage, overvoltage, relief valve discharge, locked rotor trip, low suction pressure, emergency start.

A fail to start alarm shall occur if the motor controller sees less than 20% of FLA after an adjustable time delay of 1-90 seconds.

A solid state pressure transducer shall be provided, rated for 600 psig with +/- 1.5% accuracy. The pressure START and STOP points shall be adjustable in increments of (1) psig. A LOW PRESSURE pre-alarm, indicated with a flashing green LED, shall denote a potential pump starting condition and will remain lit once the pump has started to indicate the starting cause.

A "FUTURE" relay shall be provided to indicate any one of the following conditions, as selected by the user: Fail to start, low pressure, motor overload (125% of FLA), interlock on, low suction pressure, undervoltage, overvoltage, pump run, or respond to a dry contact wired to terminals in the controller.

A restart time delay of two (2) seconds shall be provided to allow the residual voltage of the motor to decay prior to re-starting the motor. In the event that the pump motor continues to run after a request to stop, then the controller must display a "fail to stop" message to indicate this condition.

Overvoltage and undervoltage sensing and alarm shall be provided.

The controller shall be equipped with a line printer-recorder which shall produce hard copy reports of system status and alarm conditions.

D. Fittings

The unit shall be furnished with compound suction gauge, discharge gauge, and casing relief valve. The casing relief valve shall be equal to Cla-Val model 55L.

Other fittings which required are: test header with valves, caps, and chains and suction control valve.

E. Jockey Pump

Provide a jockey pump rated for 8 gpm at 55 psig. It shall be a pump direct coupled to an open drip proof motor, .5 hp, 3 phase, 208 volts, with a minimum 1.15 service factor. The jockey pump shall be equal to ITT/AC Jockey Pump.

The jockey pump shall be operated automatically by means of a jockey pump controller. The controller shall contain an across the line starter with a combination circuit breaker / overload motor protector. The controller shall be supplied with a digital display that shall indicate system pressure, start pressure, stop pressure. The digital display shall be supplied with a solid state 4-20mA pressure sensor. The start and stop points shall be adjustable in increments of one psig. The jockey pump controller shall be Eaton Jockey Pump Controller.

F. Miscellaneous

Provide the following items:

OCV UL & FM approved 6" suction control valve with 150# flanges.

G. Test And Acceptance
Comply with the requirements of the governing authority and NFPA 20 for installation of the fire pump and in accordance with the manufacturer's written instructions and in accordance with recognized industry practices. Fire pump installation shall be tested and accepted in accordance with NFPA 20 and the governing authority. Local representatives of the pump manufacturer and the controller manufacturer shall be present to conduct the test. Subcontracting of the acceptance test will not be acceptable. Owner's representative shall be instructed in proper operation of the fire pump system upon completion of acceptance test.

2.05 ORIGIN

A. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 All joining materials for ductile iron pipe shall be of a type, make and quality approved by the Architect and shall conform to the following requirements:

3.02 Prior to connecting to the overhead piping, the underground main should be flushed in the presence of a representative of the Owner and meet with his approval.

3.03 Piping in the areas having ceiling shall be concealed. Where ceilings have grids, sprinkler heads shall be centered with the grid. Piping in other areas may be exposed, but kept at a minimum distance from structural system. All piping shall be free of rust, clean and have a minimum of one (1) shop coat of clear rust inhibiting paint or a color as selected by Architect.

3.04 Valves shall be complete with all necessary items, fittings, identification tags or plates, and accessories, including water motor gong. Design shall allow for suitable drainage of same.

3.05 Where piping passes through walls, floors, ceilings or other building construction, sleeves must be used. Where exposed piping passes through finish work escutcheons shall be chrome plated or other finishes acceptable to the Architect. Split wall plates or escutcheons shall be installed to fit snugly around piping. Where finish is not a problem, suitable plates shall be provided at each hole to assure effectiveness of construction as a fire stop.

3.06 Before assembly of couplings, lightly coat pipe ends and outside of gaskets with cup grease or graphite paste.

3.07 Pipe grooving shall be in accordance with the manufacturer's specifications contained in latest published literature.

3.08 OS&Y valves, where shown on the drawings, shall be electrically supervised with tamper switch wired to alarm bell at central panel. Coordinate wiring with valve and controls.

3.09 All openings for piping should be anticipated and indicated on the approved and accepted shop drawings. Any additional cutting of openings must have the written approval of the Architect.

3.10 After completion of all installations, tests, etc., and prior to the building opening date, the fire protection contractor shall instruct the Owner in the operation of the fire protection system. Special care shall be taken to make sure the Owner:

A. Will immediately recognize whether the main valve is in an open or closed position.

B. Will know how to drain the system.

C. Will know how to test the alarm valve.

D. Will know how to reset all systems and how they are interconnected.

3.11 Testing of the fire protection system shall be as outlined in hereinbefore listed NFPA Standards.

END OF SECTION

SECTION 22 0500
COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for complete plumbing system.

1.02 RELATED SECTIONS

A. Section 22 05 48 – Vibration and Seismic Controls for Plumbing Piping and Equipment.

B. Section 22 10 05 – Plumbing Piping.

C. Section 22 30 00 – Plumbing Equipment.

D. Section 22 40 00 – Plumbing Fixtures.

E. Section 31 23 16 – Excavation.

1.03 SITE INSPECTION

A. Examine premises and understand the conditions which may affect performance of work of this Division before submitting proposals for this work.

B. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

1.04 DRAWINGS

A. Mechanical drawings show general arrangement of piping ductwork, equipment, etc. Follow closely as actual building construction and work of other trades will permit.

B. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over mechanical drawings.

C. Because of the small scale of mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves and accessories required to meet the conditions.

D. Record difference between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Architect. Return these prints to Architect at completion of project. These will be labeled "Contractor Revised Drawings".

1.05 SUBSTITUTIONS

A. The naming of specified items on the drawings or in the specifications is intended to establish a level of quality and performance. Substitution requests may be submitted at the time of shop drawing submittal. Review of substituted equipment or material prior to the Bid

Date will not be considered unless otherwise specified.

B. Substitution shall be submitted as specified in Division 01.

1.06 CODE REQUIREMENTS, FEES & PERMITS

A. Perform work in accordance with applicable provisions of state and local Plumbing Code, gas ordinances and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations and ordinances.

B. In case of differences between building codes, state laws, local ordinances, utility company regulations and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.

1.07 CONTRACTOR REVISED DRAWINGS

A. The contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.

B. Exact location of all underground utility service entrances and their connections to utility mains, well heads, loop piping and all valves, etc., which will be concealed in the finished work shall be accurately indicated on the drawings by measured distances.

C. Upon completion of the work and prior to final payment, the contractor shall furnish to the Architect, one set of "contractor revised" prints, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the contract drawings.

D. Contractor shall include all addendum items and field change order information on the revised drawings. Revise all schedules shown on the drawings to reflect the actual model numbers, capacities and electrical characteristics of substituted equipment.

1.08 COORDINATION OF WORK

A. It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of the Contract Documents. Anything not clear or in conflict will be explained by making application to Architect. Should conditions arise where certain changes would be advisable, secure Architect's approval of these changes before proceeding with work.

B. Coordinate work of various trades in installing inter-related work. Before installation of mechanical items, make proper provisions to avoid interferences in a manner approved by Architect. Changes required in work specified in Division 22 caused by neglect to do so shall be made at no cost to Owner.

C. Provide inserts and supports required by Division 22 unless otherwise noted. Furnish sleeves, inserts, supports and equipment that are an integral part of other divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location of installation of items above shall be borne by Division 22.

D. Be responsible for required digging, cutting and patching incident to work of this Division and make required repairs afterward to satisfaction of Architect. Cut carefully to minimize

necessity for repairs to existing work. Do not cut beams, columns or trusses.

1. Each Section of this Division shall bear expense of cutting, patching, repairing and replacing of work of other Sections required because of its fault, error, tardiness or because of damage done by it.
2. Cutting, patching, repairing and replacing pavements, sidewalks, roads and curbs to permit installation of work of this Division is responsibility of Section installing work.

E. Adjust locations of pipes, etc. to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.

1. Make offsets, transitions, and changes in direction of pipes, as required to maintain proper headroom and pitch of sloping lines whether or not indicated on Drawings.

F. Slots and openings through floors, walls, ceilings and roofs shall be provided by other Divisions in their respective materials. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.09 EXCAVATION AND TRENCHING FOR PIPING

A. Excavate to the depths indicated on the Drawings or as otherwise specified. Coordinate with Geotechnical Engineer for undercut requirements due to expansive soils Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulated therein shall be removed by pumping or by other approved method. Do sheeting and shoring as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of trench may be tunneled if the pipe can be safety and properly installed and backfill can be properly tamped in such tunnel sections.

B. Trench Excavation: Bottom of trench for tile or concrete pipe shall be rounded so that at least the bottom quadrant of the pipe rests firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered, excavate to a minimum overdepth of 4" below trench depths indicated on the drawings or specified. Overdepths in rock excavation and unauthorized overdepths shall be backfilled. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered, such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.

C. Depth of Cover: Trenches shall be of depth that will provide a minimum depth of cover of three feet for water, sanitary and storm sewer and two feet for gas piping from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.

1.10 BACKFILLING OF TRENCHES

A. Trenches shall not be backfilled until required pressure and other tests have been performed, inspection of utility and Code officials have been accomplished, and until the utilities systems as installed conform to requirements of drawings and specifications.

B. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones over 2-1/2-inch maximum dimension, deposited in 6-inch layers and compacted to 95% of the maximum laboratory density determined in accordance with ASTM D-698, Moisture-Density Relation of Soils. Tests for maximum density will be made with expense borne by contractor. If fills fail

to meet the specified densities, the contractor shall remove and recompact the fill until specified densities are achieved.

C. Tests for Displacement of Sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the contractor at his expense.

1.11 GENERAL PIPING INSTALLATION

A. Furnish and install a complete system of piping. The piping drawings are diagrammatic and indicate the general location and connections. If the size of any piping is not clearly evident, obtain instructions from the Architect before proceeding with the work. The piping may have to be offset, lowered or raised as required or as directed at the site. This does not relieve the contractor from responsibility for the proper erection of systems of piping in every respect suitable for the work intended. Piping systems that are not to be installed complete shall be so noted.

B. Erection: Piping shall be cut accurately for fabrication to measurements established at the construction site. Pipe shall be worked into place without springing and/or forcing. Remove all burrs and cutting slag by reaming or other cleaning methods. Changes in direction shall be made with fittings, except that bending of pipe will be permitted, providing a hydraulic pipe bender is used. Bent pipe showing kinks, wrinkles, or other malformation will not be acceptable. Piping shall be arranged so as not to interfere with removal of other equipment or devices nor to block access manholes or other access openings. Piping shall be installed to insure noiseless circulation.

C. Minimum slope of piping shall be in accordance with the following unless otherwise specifically shown on the drawings or specified:

Type of Piping Fluid Conveyed	System Component	Length for 1" Fall	Direction of Fall
Sewer, Sanitary	Main or Branch	4 feet	Direction of flow
Domestic Water	Main or branch	40 feet	Back to mains

Sanitary and storm drainage piping 4 inches in diameter and larger may be pitched with one (1) inch fall for eight (8) foot lengths.

D. Protection: Open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the system. Plugs or rags, wood, cotton, concrete, waste or similar materials must not be used in plugging.

E. Installation of Underground Pipe: Bottom of trench shall be shaped to give substantially uniform circumferential support to lower third of each pipe. Pipe shall be laid true to line and grade in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets to flow line. As work progresses, interior of pipe shall be cleared of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe size, a suitable swag or drain shall be kept in pipe and pulled forward past each joint immediately after jointing has been completed. Trenches shall be kept free from water until pipe jointing has set and pipe shall not be laid when condition of trench or weather is unsuitable for such work.

F. Cleaning and Flushing: Contractor shall take every precaution to remove dirt, grease, and all other foreign matter from each length of piping before making connections in the field. After each section of piping is installed, it shall be flushed with clean water except where specified otherwise.

G. Pipe Sizes: If the size of any piping is not clearly evident in the drawings, the contractor shall request instructions from the Architect as to the proper sizing. Any changes resulting from the contractor's failure to request clarification shall be at his expense.

1.12 THERMAL AND MOISTURE PROTECTION

A. Install flashing, counterflashing and caulk or seal all penetrations in exterior walls or floors as required to prevent exterior moisture from entering building.

1.13 EQUIPMENT AND MATERIALS

A. Product Approvals:
   1. If approval is received to use other than specified items, responsibility for specified capacities and ensuring that items to be furnished will fit space available lies with this Division.
   2. In the event other than specified equipment is used and will not fit job site conditions, this Division assumes responsibility for replacement with items named in specification.

B. Use domestic made pipe, pipe fittings and motors on project.

C. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connection and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.

D. Follow Manufacturer's directions in delivery, storage, protection and installation of equipment and materials.
   1. Promptly notify Architect in writing of conflicts between requirements of Contract Documents and manufacturer's directions and obtain Architect's written instructions before proceeding with work. Bear expenses arising from correcting deficiencies of work that do not comply with Manufacturer's directions or such written instructions from Architect.

E. Deliver equipment and material to site and tightly cover to protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in a dry, heated space.

1.14 REVIEW OF MATERIALS AND EQUIPMENT

A. Furnish complete catalog data for manufactured items of equipment to be used in Work to Architect for review within 30 days after award of Contract.

B. Submit six (6) copies of data in 3-ring binders with tab indices in same order and name as they appear in specification.
   1. State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions and other pertinent information. Pertinent information shall include as a minimum those items as scheduled on the drawings. Arrange submittal information

to reflect these categories scheduled on the drawings.

2. Provide an index of tab numbers at the front of each binder. List the specification number and category included under each tab as described in the specifications and as scheduled on the drawings.
3. Provide cover sheet for each tab section. List each piece of equipment by name, model number and supplier.
4. Underline applicable data and indicate model being supplied on each submittal sheet.

C. If data is not submitted as specified or submittal is not complete, it will be returned without review.

D. Catalog data or shop drawings for equipment which are noted as being reviewed by the Architect, shall not supersede Contract Documents.

E. Review comments of Architect shall not relieve this Division from responsibility for deviations from Contract Documents unless Architect's attention has been called to such deviations in writing at the time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

F. Check work described in catalog data with Contract Documents for deviations and errors.

1.15 GUARANTEE

A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or in the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.

B. The Contractor shall, after completion of the original test of the installation, and acceptance of the Architect, provide any service incidental to the proper performance of the mechanical systems under guarantees outlined above for a period of one (1) year.

1.17 FINALLY

A. It is the intention that this specification shall provide a complete installation except as hereinbefore specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included.

B. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

PART 2 PRODUCTS

Not Applicable.

PART 3 EXECUTION

Not Applicable.

END OF SECTION

SECTION 22 0501
PLUMBING DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of general demolition work is shown on drawings. Coordinate the required mechanical and plumbing work with the general demolition.

B. Demolition includes removal of systems and removal and disposal of demolished materials, as shown on drawings and herein specified.

C. The Owner shall have the option of retaining any items removed. The Contractor shall deliver these items to the Owner's designated storage area. Any items not retained by the Owner shall be disposed of off-site by the Contractor.

1.03 JOB CONDITIONS

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The contractor shall visit the site and determine the actual conditions prior to bidding.

B. Partial Removal: Items of salvable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.

1. Storage or sale or removed items on site will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

D. Protections; Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

1. Install temporary mechanical services, plumbing, temperature control, etc., as required by the Owner or authorities having jurisdiction.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

F. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with Owner at least 24 hours in advance.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
2. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

G. If Contractor is required to disconnect utility services or other services to an occupied area, the Contractor shall provide temporary or alternative service to that area, as required by Owner.

PART 2 PRODUCTS

(Not applicable)

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove all equipment, piping, etc., as indicated on the drawings.

B. All items shown to remain active shall be furnished with necessary devices or accessories.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.

   1. Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:

   1. Transport materials removed from demolished structures and dispose of off-site.

END OF SECTION 23 05 01

SECTION 22 0513
COMMON ELECTRICAL REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section specifies the basic requirements for electrical components which are an integral part of packaged PLUMBING equipment. These components include, but are not limited to factory installed motors furnished as an integral part of plumbing equipment.

B. This section specifies the basic requirements for electrical components required to be furnished under Division 22, which are to be turned over to and installed by Division 26. These components include but are not limited to motors.

C. Specific electrical requirements (i.e., horsepower and electrical characteristics) for plumbing equipment are scheduled on the drawings.

1.02 RELATED SECTIONS

A. Section 22 3000 – Plumbing Equipment.

1.03 REFERENCES

A. NEMA Standards MG-1: Motors and Generators.

B. NEMA Standard ICS 2: Industrial Control Devices, Controllers and Assemblies.

C. NEMA Standard 250: Enclosures for Electrical Equipment.

D. NEMA Standard KS 1: Enclosed Switches.

E. Comply with National Electrical Code (NFPA 70).

F. Compliance and Labeling: Provide motors and starters which have been listed and labeled by a nationally recognized testing facility engaged in and equipped to test electrical equipment and materials.

1.04 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.05 QUALITY ASSURANCE

A. Electrical components and materials shall be UL labeled.

PART 2 PRODUCTS

2.01 MOTORS

A. The following are basic requirements for simple or common motors, for special motors, more

detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that driven load will not requirement the motor to operate in the service factor range.
3. 2-speed motors shall be 2 separate windings on polyphase motors.
4. Temperature Rating: Rated for 40 deg. environment, with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).
5. Starting capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly timed spaced starts per hour for manually controlled motors.
6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.

B. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.

1. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
2. Bearings:
   a. Ball or roller bearings with inner and outer shaft seals;
   b. Regreasable, except permanently sealed where motor is normally inaccessible for regular maintenance.
   c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
   d. For fractional horsepower, light duty motors, sleeve type bearings are permitted.
3. Enclosure Type:
   a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
   b. Guarded drip-proof motors where exposed to contact by employees or building occupants.
   c. Weather protected Type I for outdoor use, Type II where not housed;
4. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
5. Noise Rating: "Quiet" rating on motors located in occupied spaces of building.
6. Efficiency: Provide "Energy Efficient" motors with a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a minimum efficiency as listed below.

1HP	80% Eff'y	10HP	87%
1-1/2 to 2HP	82%	15HP	89%
3HP	83%	20HP	90%
5HP	84%	25HP and up	91%
7-1/2 HP	85%		

C. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following:
Baldor Electric Co.
Century Electric, Inc.
General Electric Co.
Marathon Electric Mfg. Co.
Reliance Electric Co.
Westinghouse Electric Corp.

D. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

PART 3 EXECUTION

Not Applicable.

END OF SECTION

SECTION 22 0516
EXPANSION COMPENSATION FOR PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for expansion compensation for the plumbing system.

1.02 RELATED SECTIONS

A. Section 22 0548 – Vibration and Seismic controls for Plumbing Piping and Equipment.

B. Section 22 1005 – Plumbing Piping.

C. Section 22 3000 – Plumbing Equipment.

D. Section 22 4000 – Plumbing Fixtures.

E. Section 31 2316 – Excavation.

1.03 SUBMITTALS

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of expansion compensation product. Submit schedule showing Manufacturer's figure number, size, location, and features for each required expansion compensation product.

B. Shop Drawings: Submit shop drawings for fabricated expansion loops indicating location, dimensions, pipe sizes, location and method of attachment of anchors.

C. Maintenance Data: Submit maintenance data and spare parts lists for each type of expansion compensation product. Include this data in Maintenance Manual.

1.04 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of expansion compensation products of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Comply with standards of the Expansion Joint Manufacturer's Association (EJMA).

PART 2 PRODUCTS

2.01 PIPE ALIGNMENT GUIDES

A. General: Provide pipe alignment guides on both sides of expansion joints, and elsewhere as indicated. Construct with 4 finger spider traveling inside a guiding sleeve, with provision for anchoring to building substrate.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pipe alignment guides which may be incorporated in the work include, but are not limited to, the following:
Keflex, Inc.

Metraflex (The) Co.

PART 3 EXECUTION

3.01 EXPANSION LOOPS

A. General: Fabricate expansion loops as indicated, in locations indicated, and elsewhere as determined by Installer for adequate expansion of installed piping system. Subject loop to cold spring which will absorb 50% of total expansion between hot and cold conditions. Provide pipe anchors and pipe alignment guides as indicated, and elsewhere as determined by Installer to properly anchor piping in relationship to expansion loops.

END OF SECTION

SECTION 22 0519
METERS AND GAUGES FOR PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extent of meters and gauges required by this section is indicated on drawings and/or specified in other Division-22 sections.

B. Types of meters and gauges specified in this section include the following:
   1. Temperature Gauges and Fittings:
      Glass Thermometers.
      Dial Type Insertion Thermometers.
      Thermometer Wells.
      Temperature Gauge Connector Plugs.
   2. Pressure Gauges and Fittings:
      Pressure Gauges.
      Pressure Gauge Cocks.
      Pressure Gauge Connector Plugs.

C. Meters and gauges furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division-22 sections.

1.02 RELATED SECTIONS

A. Section 22 1005 – Plumbing Piping.

B. Section 22 3000 – Plumbing Equipment.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of meters, gauges, and fittings, or types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.

C. ANSI and ISA Compliances: Comply with applicable portions of ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.04 SUBMITTALS

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of meter, gauge and fitting. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit meter, gauge and fitting schedule shown manufacturer's figure number, scale range, location, and accessories for each meter, gauge and fitting.

B. Maintenance Data: Submit maintenance data and spare parts lists for each type of meter and gauge. Include this data in maintenance manual.

PART 2 PRODUCTS

2.01 TEMPERATURE GAGES

A. Glass Thermometers:
   1. General: Provide glass thermometers of materials, capacities and ranges indicated, designed and constructed for use in service indicated.
   2. Case: Die cast aluminum, finished in baked epoxy enamel, clear acrylic plastic front, spring secure, 9 inches long.
   3. Adjustable Joint: Die cast aluminum, finished to match case, 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
   4. Tube and Capillary: Mercury filled, magnifying lens, 1 percent scale range accuracy, shock mounted.
   5. Scale: Satin faced, non-reflective aluminum permanently etched markings.
   6. Stem: Copper-plated steel, or brass, for separable socket, length to suit installation.
   7. Range: Conform to the following:
      a. Hot Water: 30 degrees - 240 degrees F with 2 degree F scale divisions (0 degrees - 160 degrees Celsius) with 1 degree Celsius scale divisions.
      b. Chilled Water: 30 degrees - 180 degrees F with 2 degrees F scale divisions (0 degrees-100 degrees Celsius) with 1 degree Celsius scale divisions.
   8. Available Manufacturers: Subject to compliance with requirements, manufacturers offering glass thermometers which may be incorporated in the work include, but are not limited to, the following:
      Marshalltown Instruments, an Eltra Co.
      Trerice (H.O.) Co.
      Weiss (Albert A) & Son, Inc.

B. Dial Type Insertion Thermometers:
   1. General: Provide diam type insertion thermometers of materials, capacities and ranges indicated, designed and constructed for use in service indicated.
   2. Type: Bi-metal, stainless steel case and stem, 1 inch diameter dial, dust and leak proof, 1/8 inch diameter stem with nominal length of 5 inches.
   3. Accuracy: 0.5 percent of dial range.
   4. Range: Conform to the following:
      a. Hot Water: 0 degrees - 220 degrees F (-10 degrees - 110 degrees C).
   5. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial type insertion thermometers which may be incorporated in the work include, but are not limited to, the following:
      Marsh Instrument Co, Unit of General Signal.
      Taylor Instrument Process Control Div. of Sybron Corp.
      Trerice (H.O.) Co.
      Weiss (Albert A.) & Son, Inc.

C. Thermometer Separable Wells:
   1. General: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2 inch extension for insulated piping.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering thermometer wells which may be incorporated in the work include, but are not limited to the following:

Marsh Instrument Co., Unit of General Signal.
Trerice (H.O.) Co.
Weiss (Albert A.) & Sons, Inc.

D. Temperature Gage Connector Plugs:
1. General: Provide temperature gage connector plugs pressure rated for 500 psi and 200 degrees F. Construct of brass and finish in nickel-plate, equip with 1/2 inch NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8 inch O.D. probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness for insulated piping.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering temperature gage connector plugs which may be incorporated in the work include, but are not limited to, the following:
Peterson Engineering Co.

2.02 PRESSURE GAGES AND FITTINGS

A. Pressure Gages:
1. General: Provide pressure gages of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
2. Type: General use, 1 percent accuracy, ANSI B40.1, Grade A, phosphor bronze bourbon type, bottom connection.
3. Case: Drawn steel or brass, clear acrylic plastic lends, 4-1/2 inch diameter.
4. Connector: Brass with 1/4 inch male NPT. Provide protective syphon when used for steam service.
5. Scale: White coated aluminum with permanent etched markings.
6. Range: Conform to the following:
a. Water: 0 - 100 psi.
7. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gauges which may be incorporated in the work include, but are not limited to, the following:
Ametek, U.S. Gauge Div.
Marsh Instrument Co., Unit of General Signal.
Marshalltown, an Eltra Company
Trerice (H.O.) Co.
Weiss (Albert A.) & Son, Inc.

B. Pressure Gage Cocks:
1. General: Provide pressure gauge cocks between pressure gages and gauge tees on piping systems. Construct gage cock of brass with 1/4 inch female NPT on each end, and "T" handle brass plug.
2. Syphon: 1/4 inch straight coil constructed of brass tubing with 1/2 inch male NPT on each end.
3. Snubber: 1/4 inch brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
4. Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gage cocks which may be incorporated in the work include, but are not limited to, the following:
Ametek, U.S. Gauge Div.
Marsh Instrument Co., Unit of General Signal.
Marshalltown, An Eltra Company

Trerice (H.O.) Co.
Weiss (Albert A.) & Son, Inc

C. Pressure Gage Connector Plugs:
   1. General: Provide pressure gage connector plugs pressure rated for 500 psi and 200 degrees Fahrenheit. Construct of brass and finish in nickel-plate, equip with 1/2 inch NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8 inch O.D. probe assembly from dial type insertion pressure gage. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness for insulated piping.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gauge connector plugs which may be incorporated in the work include, but are not limited to, the following:
      Peterson Engineering Co.

PART 3 EXECUTION

3.01 INSTALLATION OF TEMPERATURE GAGES

A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.

B. Thermometer Separable Wells: Install in piping for each temperature gage.

C. Temperature Gage Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.02 INSTALLATION OF PRESSURE GAGES

A. General: Install pressure gages in piping with pressure gage cock, located on pipe at most readable position.

B. Locations: Install in the following locations, and elsewhere as indicated:
   1. At suction and discharge of each hydronic pump or as a common gauge, if so detailed on drawings.
   2. At each pressure reducing valve on both the high pressure and low-pressure sides.
   3. At water service outlet.

C. Pressure Gage Cocks: Install in piping tee with snubber.

D. Pressure Gage Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

END OF SECTION

SECTION 22 0548
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING

PART 1 GENERAL

1.01 SCOPE

A. The requirements for seismic protection measures to be applied to plumbing equipment specified herein are in addition to any other items called for in other sections of these specifications. The seismic protection shall conform to Category C of the 2021 Arkansas Fire Prevention Code. The Plumbing equipment shall include the following items to the extent required on plans or in other sections of the following specifications:

Piping, 2-1/2 inches or larger
Components weighting more than 75 pounds
Water Heaters

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Requirements – Section 22 0500.

1.03 APPLICABLE PUBLICATIONS

A. American Society of Civil Engineers: ASCE 7

B. Federal Specifications:
1. RR-W-410D

1.04 REGULATORY REQUIREMENTS

A. Conform to 2021 Fire Prevention Code.

PART 2 PRODUCTS

2.01 Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and shown.

2.02 Sway brace of structural steel conforming with ASTM A36.

2.03 Mechanical couplings of the sleeve type to provide a tight flexible joint under all reasonable conditions.

2.04 Squarehead bolts and heavy hexagon nuts, ANSI B18.2.1 and B12.2.2 and ASTM A307or 306.

2.05 Guy wires where required shall conform to Fed Spec. RR-W-441 as follows:

5/32" diameter	Type V, Class 1
3/16" to 5/16" diameter	Type V, Class 2
1/4" to 5/8" diameter	Type I, Class 2

PART 3 EXECUTION

3.01 All rigidly mounted equipment will have a minimum of four (4) anchor bolts securely fastened through bases or backs. Anchor bolts must conform to ASTM A307. Anchor bolts shall have an embedded straight length equal to at least twelve times the nominal diameter of the bolt and shall conform to the applicable tables for various equipment weights.

Maximum Equipment Weight (Pounds)	
500	1/2
1,000	1/2
5,000	1/2
10,000	1/2
20,000	1/2
30,000	5/8
50,000	3/4
100,000	1

Based on four (4) bolts per item, a minimum embedment of 12 bolt diameters, a minimum bolt spacing of 16 bolt diameters and a minimum edge distance of 12 bolt diameters. Use equivalent total cross-sectional area when more than four bolts per item are provided. Anchor bolts that exceed normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths. When height-to-width ratio of the equipment exceeds 8.9, overturning must be investigated. Expansion anchors shall not be used to resist seismic or vibratory loads unless test data are provided to verify the adequacy of the specific anchor and application. In no case shall the expansion anchor size be less than that required for bolts in the preceding table. Selection of anchor bolts for vibration isolation devices and/or snubbers to equipment base and foundations shall follow the same procedure, except that an equipment weight equal to five times the actual equipment weight shall be used

3.02 Equipment Sway Bracing shall be provided for all items supported from overhead floor or roof structures. Braces shall consist of angles, rods, bars, or pipes run at a 45-degree angle from the equipment frame to the building structure secured at both ends with no less than 1/2 inch bolts. Braces shall conform to all applicable codes and standards for Seismic Classification. Bracing shall be provided in two planes of directions, 90 degrees apart, for each item of equipment. Details of all equipment bracing shall be submitted for approval. In lieu of bracing with vertical supports, these items may be supported with hangers inclined at 45-degrees, provided that supporting members are properly sized to supporting operating weight of equipment when inclined at a 45-degree angle.

3.03 Sway bracing shall be provided for all 2-1/2 inch or larger pipes, not individually supported with hangers 12 inches or less in length. Longitudinal bracing shall be at 80' max spacing. Traverse bracing shall be at 40' max spacing.

3.04 All components that weight more than 75 pounds shall have a safety chain or safety cable in addition to its other support.

3.05 Water heaters and pumps shall be bolted to the housekeeping pads in accordance with Paragraph 3.01.

3.06 Powder-activated fasteners (shot pins) shall not be used for anchorage.

3.07 Vibration isolators shall have a bumper restraint in each horizontal direction, and vertical restraints shall be provided where required to resist overturning.

3.08 Oversized plate washers extending to the equipment wall shall be used at bolted connections through

the base sheet metal if the base is not reinforced with stiffeners or not capable of transferring the required loads.

END OF SECTION

SECTION 22 0553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-23 sections.

B. Type of identification devices specified in this section include the following:
Plastic Pipe Markers.
Valve Tags.
Valve Schedule Frames.
Engraved Plastic-Laminate Signs.
Ceiling Tacks.

C. Mechanical identification furnished as part of factory-fabricated equipment, is specified as part of the equipment assembly in other Division-23 sections.

1.02 RELATED SECTIONS

A. Section 22 1005 – Plumbing Piping.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. ANSI Standards: Comply with ANSI A13.1 for lettering size, colors, and viewing angles of identification devices.

1.04 SUBMITTALS

A. Product Data: Submit product specifications and installation instructions for each identification material and device desired.

B. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

C. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in margin of schedule. In addition to mounted copies, furnish extra copies for Maintenance Manuals as specified in Division 1.

PART 2 PRODUCTS

2.01 MECHANICAL IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-21 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

B. Plastic Pipe Markers:
   1. General: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent, color-coded, plastic-sheet pipe markers, complying with ANSI A13.1.
      a. Small Pipes: For external diameters less than 6 inches (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
         (1) Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
         (2) Adhesive lap joint in pipe marker overlap.
         (3) Laminated or bonded application of pipe marker to pipe (or insulation).
      b. Large Pipes: For external diameters of 6 inches and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:
         (1) Laminated or bonded application of pipe marker to pipe (or insulation)
         (2) Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless-steel bands.
      c. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with names as shown or specified.
      d. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.
      e. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

C. Valve Tags:
   1. At the Contractor's option, provide one of the following:
      a. Brass Valve Tags: provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in 1/4 inch high letters and sequenced valve numbers 1/2 inch high, and with 5/32 inch hole for fastener. Provide 1-1/2 inch diameter tags, except as otherwise indicated.
      b. Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32 inch thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4 inch high letters and sequenced valve numbers 1/2 inch high, and with 5/32 inch hole for fastener. Provide 1-1/2 inch square black tags with white lettering, except as otherwise indicated.
   2. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

D. Valve Schedule Frames:
   1. General: For each page of the valve schedule, provide a glazed display frame, with screws for removable mounting on walls. Provide frames of rigid plastic or metal, with plastic glazing.

E. Engraved Plastic-Laminate Signs:
   1. General: Provide engraving stock melamine plastic laminate, complying with FS L- P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
   2. Thickness: 1/16 inch for units up to 20 square inches or 8-inch length; 1/8-inch for larger units.
   3. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering plastic pipe markers which may be incorporated in the work include, but are not limited to, the following:

   Seton Name Plate Company
   EMED Co., Inc.
   Approved equal.

2.02 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/ maintenance of plumbing systems and equipment.

B. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:
   1. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Piping System Identification:
   1. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces, (shafts, tunnels, plenums), exterior non-concealed locations and above removable acoustical ceilings.
      a. Near each valve and control device.
      b. Near each branch, excluding short take-offs for fixtures, mark each pipe

at branch, where there could be question of flow pattern.

c. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.

d. At access doors, manholes and similar access points which permit view of concealed piping.

e. Near major equipment items and other points of origination and termination.

f. Spaced intermittently at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

g. On piping above removable acoustical ceilings.

C. Valve Identification:

1. General: Provide valve tag on every valve, cock and control device in each piping system.

2. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.

a. Where more than one major machine room is shown for project, install mounted valve schedule in each major machine room, and repeat only main valves which are to be operated in conjunction with operations of more than single machine room.

D. Plumbing Equipment Identification:

1. General: Install engraved plastic laminate sin on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.

b. Pumps and similar motor-driven units.

c. Fans, blowers, primary balancing dampers and mixing boxes.

d. Central-station units.

e. Tanks and pressure vessels.

f. Motor starters and other control equipment.

E. Refer to Division-22 sections for identification requirements at central-station mechanical control center; not work of this section.

F. Refer to Division-26 sections for identification requirements of electrical work; not work of this section.

G. Lettering Size: Minimum 3/8-inch-high lettering for name of unity where viewing distance is less than 2'-0"; 3/4 inch high for distances up to 6'-0"; and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 the size of principal lettering.

H. Text of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, and warn of hazards and improper operations.

I. Operational valves and similar minor equipment items located in non-occupied spaces (including machine rooms) may, at installer's option, be identified by installation of plasticized tags in lieu of engraved plastic signs.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulation Requirements for complete plumbing piping system.

1.02 RELATED SECTIONS

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0553 – Identification for Plumbing Piping

C. Section 22 0548 – Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 22 1005 – Plumbing Piping.

E. Section 22 3000 – Plumbing Equipment.

F. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C195 - Mineral Fiber Thermal Insulation Cement.

C. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

D. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

E. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

F. ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

G. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

H. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

I. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

J. ASTM E96 - Water Vapor Transmission of Materials.

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 22 0500.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/100 or less in accordance with ASTM E84, NFPA 255, and UL 723.

1.06 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 22 0500.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

PART 2 PRODUCTS

2.01 GLASS FIBER

A. Insulation: ASTM C547; rigid molded, noncombustible.
   1. "K" value: ASTM C335, 0.24 at 75 degrees F.
   2. Minimum Service Temperature: -20 degrees F.
   3. Maximum Service Temperature: 850 degrees F.
   4. Maximum Moisture Absorption: 0.2 percent by volume.

B. Vapor Barrier Jacket:
   1. ASTM C921, white kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
   3. Secure with adhesive applied to longitudinal laps and butt strips.
   4. Secure with vapor barrier mastic.
   5. Self-sealing laps may be used provided lap seal is additionally sealed with vapor barrier masters.
   6. Maximum Water Vapor Transmission: 0.1 perm.

2.02 APPROVED MANUFACTURERS

A. Glass Fiber:
   1. Owens/Corning Fiberglass.

2. Architect Approved - Other acceptable manufacturers offering equivalent products.

B. Vapor Barrier Jacket Lap Adhesive - Compatible with insulation:
1. Foster 25.
2. Architect Approved.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. On exposed piping, locate insulation and cover seams in least visible locations.

C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
1. Provide vapor barrier jackets, factory applied or field applied.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
3. Finish with glass cloth and vapor barrier adhesive.
4. PVC fitting covers may be used.
5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. For insulated pipes conveying fluids above ambient temperature:
1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
3. Finish with glass cloth and adhesive.
4. PVC fitting covers may be used.
5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

E. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert Location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

F. Finish insulation at supports, protrusions, and interruptions.

G. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum or stainless-steel jacket with seams located on bottom side of horizontal piping.

H. For buried piping, provide factory fabricated assembly with inner all-purpose service jacket with self sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

I. For heat traced piping, insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

J. Valves and fittings insulated with block insulation shall be finished with insulating cement and troweled to a smooth and uniform finish.

3.03 TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEMS	THICKNESS
A. Plumbing Systems	
Domestic Hot Water Supply	1 inch
Domestic Hot Water Recirculation	1 inch
Domestic Cold Water (Indoors)	1 inch
Domestic Cold Water (Out of Doors)	2 inch
Storm Water	1 inch

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for complete plumbing piping system.

1.02 RELATED SECTIONS

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0553 – Identification for Plumbing Piping

C. Section 22 0548 – Vibration and Seismic controls for Plumbing Piping and Equipment.

D. Section 22 3000 – Plumbing Equipment.

E. Section 22 4000 – Plumbing Fixtures.

F. Section 31 2316 – Excavation.

1.03 QUALITY ASSURANCE

A. Manufacturers shall be firms regularly engaged in manufacturer of plumbing piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer shall be a firm with at least 3 years of successful installation experience on projects with plumbing piping system work similar to that required for project.

C. Comply with applicable provisions of ANSI B31.2 "Fuel Gas Piping", applicable provisions of NFPA 54 (ANSI Z223.1) "National Fuel Gas Code", ANSI Z223.1a "Supplement to National Fuel Gas Code" and with requirements of the local gas company.

D. Comply with applicable codes and standards.

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 22 0500.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with a minimum three years' experience.

PART 2 PRODUCTS

2.01 DOMESTIC HOT AND COLD-WATER SYSTEMS

A. Pipe
1. Type "K" hard drawn copper, as made by Mueller Brass Co., for piping underground or beneath concrete slab.
2. Type "L" hard drawn copper, as manufactured by Mueller Brass Co., for above ground applications.

B. Fittings
1. Wrought copper.

C. Connections
1. Sweat copper type with Stay-Safe "Bridgit" lead free silver bearing solder with Stay-Clean liquid or Stay-Clean paste flux as manufactured by J. W. Harris Co., Inc. Joints under slabs shall be brazed with Silfos brazing alloy.

D. Valves
1. Use gate valves exclusively unless otherwise specified. All valves shall be by a single manufacturer from the approved list (reference Section 15100). Valves shall be for 150psi SWP.
2. All valves shall be brass, of screwed pattern, gland stuffing box, solid wedge double seal for gate valves, non-rising stem.

E. Unions
1. All union connections on piping 2" and smaller shall be ground joint brass union, having brass taper seat and both screw ends hexagonal and shall be designed for a steam working pressure up to 150 pounds.

F. Origin
1. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

2.02 SANITARY SEWER, SOIL, STORM, WASTE AND VENT PIPING SYSTEMS

A. Piping Above Floor:
1. All lines of 2 inches and larger shall be service weight cast iron soil piping and fittings, coated inside and outside with coal tar varnish and shall be labeled with cast iron mark of quality and permanence as illustrated in Commercial Standard CS188, which indicates that it complies with this Standard.
2. Pipe and fittings used in the hubless system shall bear the registered insignia indicating that these items used in the system shall comply with the Cast Iron Soil Pipe Institute's Standard 301 (latest revision) and the ASTM "Standard Specifications for Cast Iron Soil Pipe and Fittings".
3. In horizontal installations hangers shall be provided at every other point except when the developed length between hangers exceeds four feet (4'0") they shall be provided at each joint. Hangers shall be provided at each horizontal branch and shall be placed on or immediately adjacent to the coupling. Adequate provision shall be made to prevent "shear". Where hubless components are suspended in excess of 18 inches by means of non-rigid hangers, they shall be suitably braced against movement horizontally. Piping at ceiling of mechanical room shall be suspended from spring hangers.
4. Vertical sections and their connecting branches and components shall be

secured at each stack base and at sufficiently close intervals to keep the system in alignment and to adequately support the weight of the pipe and its contents.

5. Waste arms for lavatories and urinals shall be DWV copper with cast brass adapters and wrought copper fittings.

B. Piping Below Grade Except for Kitchen Drainage – PVC Drainage Pipe:

1. All piping below grade shall be PVC, Schedule 40, DWV, ASTM D-2655, shall adhere to the installation standards set forth in ASTM D2321 or its equivalent and the bedding and backfilling of PVC pipe shall be completed as described below.
2. For all PVC pipe, the trench excavation shall be extended to a minimum depth of 6 inches below the bottom of the pipe. Where additional excavation is required due to unacceptable soil conditions, the trench bottom shall be brought back up to grade using Class I or II bedding material. This bedding material shall be installed in no greater than 8 inch compacted lifts. All bedding material shall be compacted to a minimum density of 90 percent modified proctor as outlined in AASHTO-T180. The intent of this bedding is to provide uniform support for the flexible pipe. The remaining backfill shall be in accordance to the standard details and trench requirements. The Class I or II material shall extend for 6 inches below the pipe to 6 inches above the pipe. The maximum depth of bury for PVC pipe.

C. Piping Below Grade – Hub and Spigot Type (Kitchen Piping):

1. All piping below the floor and extended outside the building shall be standard weight cast iron soil pipe and fittings unless noted otherwise, as manufactured by Tyler Pipe, Charlotte Pipe, or Griffin Pipe. All cast iron soil pipe and fittings shall be of the reinforced hub type, coated inside and outside with coal tar varnish and shall conform to the ASTM "Standard Specifications for Cast Iron Soil Pipe and Fittings".

D. Soil, waste, drain and vent piping must be of sizes noted and run as indicated on the drawings, and shall be given a uniform grade of ¼ inch per foot wherever possible, but in no case less than 1/8 inch per foot. The soil and waste pipes shall be extended through the roof. Each riser extending through the roof shall project 14" above roofline. Flashing shall be by roofing contractor. Counter flashing shall be by plumbing contractor. Where so shown, connect vents below roof.

E. Piping Exterior of Building:

1. Sanitary sewer pipe and fittings (exterior of the building) shall be same as waste piping it connects to.

F. Pipe Joints

1. PVC Solvent Welded Joints:
   a. All joints shall first be primed with purple primer/cleaner manufactured for PVC pipe. Do not use water, rags, gasoline, sandpaper or other substitutes for cleaning PVC surfaces.
   b. The cement shall be a bodied cement of approximately 800 to 1000 centipoise viscosity containing 10-20 percent (by weight) virgin PVC material solvated with tetrahydrofuran (THF). Select the proper cement (Schedule 40 cement for PVC shall be used with Schedule 40 PC pipe).
   c. Do not use all-purpose cements, ABS cement to joint PVC pipe and fittings. Apply cement with recommended applicators or pure bristle type paintbrush or the recommended size.
   d. All piping shall be cut squarely and deburred. Remove all excess cement

from around the pipe and fittings with a dry cotton rag while cement is still soft. Do not attempt cementing in the rain or the presence of moisture.

2. a) The cast iron hubless joint shall consist of cast iron soil pipe, fittings Clamp All Corporation, Anaheim Foundry Co. "Husky", or approved equal, hubless soil pipe coupling made of 24-gauge Type 304 stainless steel with Hi-Torque Clamps tightened to 100+125 inch-pounds of torque. Coupling gaskets shall be made of neoprene and shall interlock with the housing assembly to make slip free joint. Pipe and fittings shall be inserted into the sleeve and firmly seated against the center rib or shoulder of the gasket. A sound joint shall be provided in field cut lengths of pipe by having square cut ends as smooth as possible. The stainless-steel bands shall be tightened alternately and firmly to not less than 100 inch-pounds of torque.

b) The reinforced hub cast iron soil pipes shall be joined with Tyler "Ty-Seal" neoprene joints.

c) Support piping at each joint and fitting and 10'-0" maximum spacing.

G. Cleanouts

1. Cleanouts shall be provided at the ends and points in change of direction of all drain, soil and waste pipes and branches thereof, at the foot of each riser, at all offsets, in all horizontal runs at approximately 50 foot intervals for piping 4" and smaller and 100' for larger piping, and at other points where indicated on the plans or where required.
2. All cleanouts in connection with cast iron pipe, except the traps and fittings on horizontal branches, shall have tapped "Y" fittings of same size as pipe up to 4 inches, and 4 inches for all larger pipe, closed with screw plugs. All other cleanouts in connection with cast iron pipe, except those that occur in finished floor and walls, shall have heavy cast iron ferrules same size as pipe up to 4 inches, an 4 inches for all larger pipe, caulked into hub and closed with a bronze screw plug.
3. All cleanouts in finished floors shall be Zurn ZN-1400-BP-LC "Level Trol", Wade, or Jay R. Smith, with anchor flange and clamp collar, scoriated nickel-bronze access cover and adjustable frame; bronze cleanout plug shall be straight threaded with tapered shoulder.
4. All cleanouts in finished walls shall be Zurn ZN-1443-BP, Wade, or Jay R. Smith with polished nickel-bronze access cover and adjustable frame; bronze cleanout plug shall be straight threaded with tapered shoulder.
5. All cleanouts on exterior piping of building shall be Zurn "Level-Trol" ZN-1400-BP-HD, Wade, or Jay R. Smith, having heavy duty bronze top, as detailed on the Drawings.

H. Traps and Drains

1. P-traps shall be placed under all floor drains and where indicated in wastes, and at other points indicated on plans. P-traps shall be standard weight cast iron, deep seal type, bell and spigot pattern.
2. Drains shall be Zurn, Wade, or Jay R. Smith, in accordance with the schedule on the drawings.

I. Drain Pans

1. All floor drains, except for those in concrete slab above earthfill, shall be provided with non-plasticized chlorinated polyethylene, "Chloraloy 240", brand concealed water proofing membrane as manufactured by the Noble Company of Grand Haven, Michigan, Compotite Corp. "Composeal", or approved equal. Membrane shall be medium gray in color, textured surface finish both sides, have white or

black lettering continuously marked "Chloraloy 240", size 18 inches by 18 inches, turned up at least 1 inch, and meet applicable standards of ASTM. Complete installation shall be in accordance with manufacturer's recommendations.

J. Origin
1. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

2.03 NATURAL GAS PIPING SYSTEM

A. Includes:
1. Necessary labor, materials, appliances and equipment required to provide gas service from existing campus master meter on east end of building and new meter on west end of building, building distribution system from (pound to ounce) pressure regulator valve at the building to gas fired equipment connections and accessories as shown on the drawings.

B. Quality Assurance
1. Manufacturers shall be firms regularly engaged in manufacturer of natural gas piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
2. Installer shall be a firm with at least 3 years of successful installation experience on projects with natural gas piping system work similar to that required for project.
3. Comply with applicable provisions of ANSI B31.2 "Fuel Gas Piping", applicable provisions of NFPA 54 (ANSI Z223.1) "National Fuel Gas Code", ANSI Z223.1a "Supplement to National Fuel Gas Code" and with requirements of Arkansas Louisiana Gas Company.

C. Natural Gas Piping Materials and Products
1. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials use in natural gas piping systems. Where more than one type of material or product is indicated, selection is Installer's option.

D. Basic Identification
1. Provide identification complying with Division-15 Basic Materials and Methods, Section 15050 "Mechanical Identification".

E. Piping
1. Piping inside building shall be ASTM A-53, carbon steel, butt welded, Schedule 40 black steel.
2. Gas service outside building in ground shall be plastic pipe. Plastic pipe shall be "SDR-11 Driscopipe 6500" with copper trace wire, or approved equal, conforming to ASTM C2513. Connections and transition fittings shall be made by heat fusion, mechanical coupling. Mechanical coupling shall have internal stiffeners. Insulated fittings shall be provided at the meter and in the vertical rise above grade at the building. Transition fittings shall be provided at a minimum of 12 inches from all vertical risers to above grade. Gas piping shall be laid at least 24 inches below grade at all points.
3. Risers to building and to meter or pressure regulators shall be standard line pipe

provided with a mill installed protective covering of Republic "X-Tru-Coat", high density polyethylene applied over an adhesive undercoating. All field joints and fittings shall be protected with Republic "X-Tru-Tape" and primer, applied as per manufacturer's recommendations. Pipe coat/wrap shall extend a minimum of 6 inches above finish grade.

F. Fittings
1. Black Pipe:
a. Welded forged steel fittings meeting requirements of ASTM A 234-79a, or standard weight malleable iron screwed.
2. Fittings outside building shall have "X-Tru-Coat" covering.

G. Plug Valves (Cocks)
1. 1 inch and smaller:
a. Domestic Water shall be bronze, screw pattern, 125 psig, non-shock W.O.G. operating pressure, square head, lubricated tapered brass plug design, less check, FIP thread.
b. Natural gas and HVAC shall be iron, screw pattern, 125 psig, non-shock W.O.G. operating pressure, square head, lubricated tapered brass plug design, less check, FIP thread.
c. A.Y. McDonald Mfg. Co. #10686B, Dezurik/Sartell, or A/E approved equal.
2. 1-1/4 inches thru 2 inches:
a. Shall be semi-steel, screwed gland type, regular pattern, 200 CWP operating pressure, 400 psig test pressure, square head, lubricated tapered plug, FIP thread and conform to ANSI B2.1; ANSI B16.1; B116.10; API 5B; -A126, Class B and MSS SP-78.
b. Rockwell Nordstrom Valves, Inc. #114, Resun or Homestead.
3. 2-1/2 inches thru 4 inches:
a. Shall be iron, screw gland type, regular pattern, 200 CWP operating pressure, 400 psig test pressure, square head, lubricated tapered plug design, FIP thread or flanges drilled to ANSI class 125 cast iron flange standard template and conform to ANSI B2.1; ANSI B16.1; B116.10; API 5B; ASTM-A126, Class B and MSS SP-78.
b. Rockwell Nordstrom Valves, Inc. #115, Resun or Homestead.
4. 6 inches and larger:
a. Shall be iron, bolted gland type, short pattern, 200 CWP operating pressure, 400 psig test pressure, square head, lubricated tapered plug design, flanges drilled to ANSI class 125 cast iron flange standard template and conform to ANSI B2.1; ANSI B16.1; B116.10; API 5B; ASTM-A126, Class B and MSS SP-78.
b. Rockwell Nordstrom Valves, Inc. #143, Resun or Homestead.

H. Pressure Regulating Valves
1. Provide single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 2 inches and smaller, flanged ends for 2-1/2 inches and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.
2. Regulators installed indoors shall be vented to outside full size or larger as required to eliminate excessive back pressure.
3. Regulators installed outdoors shall be installed such that vent face is downward, so as to avoid the entry of water and matter which would interfere with its operation.
4. Regulators shall be equal to Rockwell Mfg. Co. (Equimeter) with internal relief.

I. Meter and Setting

1. The existing gas meter one east end of building shall be reworked (if required) by the local gas company as required by new additional gas demand indicated on the drawings. Install new meter of west end of building. All cost including any street and sidewalk repair shall be borne by this contractor.
   NOTE: A new smaller gas meter and regulator and new gas service shall also be installed on southwest side of building shown on Drawing P101.

PART 3 EXECUTION

3.01 HOT AND COLD-WATER PIPING SYSTEMS

A. For general piping insulation, see Section 22 0719.

B. Install copper tubing under slabs without joints where possible.

C. Provide adaptors in copper lines for all valves.

D. Locate cold water lines a minimum of 12 inches from hot water line.

E. Before pipes are covered, test systems in presence of Architect at 100 psi hydrostatic pressure for two (2) hours and show no leaks.

F. Sterilize domestic water system with solution containing at least 250 parts per million of available chloride. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.

G. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.

H. Water system will not be accepted until a negative bacteriological test is made on water taken from system and dosing shall be repeated as necessary until such negative test is accomplished. Submit written report of test to Architect for his approval.

I. Install water hammer arresters as noted on the drawings.

J. Extend water service piping of size and in location indicated to water service entrance at building. Provide sleeve in foundation wall for water service entry; make entry weathertight. Provide gate valve at water service entry inside building, strainer, pressure gauge, test tee and valve.

K. Provide hot and cold-water piping runouts to fixtures of sizes indicated, but in no case smaller than required by National Standard Plumbing Code.

L. Connect hot and cold-water piping system to mechanical equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shut-off valve and union for each connection. Provide drain valve on drain connections.

3.02 SANITARY SEWER, SOIL, STORM, WASTE AND VENT PIPING SYSTEMS

A. Provide floor drains and other specialties as specified in the Schedule on the drawings and set forth in these specifications.

B. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gasses pass freely to atmosphere with no pressure of syphon condition on water seal.

C. Before piping is covered, conduct tests in presence of Architect and correct leaks or defective work. Do not caulk threaded work. Fill waste and vent system to roof level (a minimum of 10 feet) with water and show no leaks for two (2) hours.

D. Vent entire system to atmosphere. Discharge 14 inches above roof. Joint lines together in fewest practicable number before projecting above roof. Set back vent lines so they will not pierce roof near an edge or valley.

E. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

F. Flash pipes passing through roof with six (6) lb/sq.ft. lead flashing fitted around pipes and turned down into pipe 1/2 inch with turned edge hammered against pipe wall.

3.03 INSTALLATION OF NATURAL GAS PIPING

A. Install natural gas distribution piping in accordance with applicable codes and local Utility Company requirements.

B. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threaded burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connections are completed.

F. Install minimum 6-inch-long drip-legs in gas piping where indicated, and where required by code or regulation.

G. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

H. Use dielectric unions where dissimilar metals are joined together.

I. Install piping with 1 inch drop in 60-foot pipe run (0.14%) in direction of flow.

J. Install piping parallel to other piping, but maintain minimum of 12-inch clearance between gas piping and steam or hot water piping above 200 degrees F.

K. Wrap and lay underground pipe with minimum of two (2) feet of cover in accordance with local gas utility company regulations and specifications.

L. Install gas cocks and unions at all final connections to equipment.

M. Do not use flexible pipe connections.

N. All field joints and fittings shall be protected with "X-Tru-Tape" and primer.

O. Bushings will not be accepted.

P. Test all gas piping with air pump and 3-inch dial gauge to pressure that will maintain 25 psig for 15 minutes.

Q. Provide sacrificial type cathodic protection for each vertical riser to the building.

R. Provide 5/8 inch by 8'-0" copper clad steel ground rod, ground rod clamp and No. 6 stranded copper conductor from ground rod to vertical riser at every instance where piping exits the earth.

3.04 GAS SERVICE

A. Consult with Gas Company as to extent of its work, meter requirements with consideration of Owner needs, costs, fees, and permits involved. Pay such costs and fees; obtain permits.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Valves and piping specialties, for complete Plumbing System.

1.02 RELATED SECTIONS

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0553 – Identification for Plumbing Piping.

C. Section 22 0548 – Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 22 1005 – Plumbing Piping.

E. Section 22 3000 – Plumbing Equipment.

F. Section 22 4000 – Plumbing Fixtures.

G. Section 31 2316 – Excavation.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

1.04 SUBMITTALS

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for pipeline strainers. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location, and features for each required pipeline strainer.

B. Maintenance Data: Submit maintenance data and spare parts lists for each type of pipeline strainer. Include this data in Maintenance Manual.

PART 2 PRODUCTS

2.01 MANUFACTURED PIPING SPECIALTIES

A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

B. Pipe Escutcheons:
   1. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
   2. Pipe Escutcheons for Moist and Wet Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
   3. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

C. Low Pressure Y-Type Pipeline Strainers:
   1. General: Comply with FCI 73-1. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 psi working pressure, with Type 304 stainless steel screens, with 3/64-inch perforations at 233 sq. in. Mechanical grooved type strainer may be used in grooved piping system.
   2. Threaded ends, 2 Inches and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
   3. Flanged Ends, 2-1/2 Inches and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
   4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering low pressure Y-type strainers which may be incorporated in the work include, but are not limited to, the following:
      American Air Filter, an Allis-Chalmers Co.
      Armstrong Machine Works.
      Hoffman Specialty, ITT Fluid Handling Div.
      Metraflex Co.
      Sarco Co., Div. of White Consolidated.
      Trerice (H.O.) Co.
      Victaulic Co. of America

D. High Pressure Y-Type Pipeline Strainers:
   1. General: Comply with FCI 73-1. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 250 psi working pressure, with Type 304 stainless steel screens, with 3/64" perforations at 233 sq. in. Mechanical grooved type strainer may be used in grooved piping systems.
   2. Threaded Ends, 2 Inches and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
   3. Flanged Ends, 2-1/2 Inches and Larger: Cast-iron body, bolted steel retainer with off-center blowdown fitted with pipe plug.
   4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high pressure Y-type strainers which may be incorporated in the work include, but are not limited to, the following:
      American Air Filter, an Allis-Chalmers Co.
      Armstrong Machine Works.
      Hoffman Specialty, ITT Fluid Handling Div.
      Metraflex Co.
      Sarco Co., Div. of White Consolidated.
      Trerice (H.O.) Co.
      Victaulic Co. of America

E. Dielectric Unions:
   1. General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolates ferrous from non-ferrous piping (electrical conductance), present galvanic action, and stop corrosion.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering dielectric unions which may be incorporated in the work include, but are not limited to, the following:
      Atlas Products Co.
      Capital Mfg. Co., Div. of Harsco Corp.
      Eclipse, Inc.
      Epco Sales, Inc.
      FMC Corp.
      McNally, Inc.
      PSI Industries.
      Stockham Valves and Fittings.

2.02 FABRICATED PIPING SPECIALTIES

A. Drip Pans: Provide drip pans fabricated from not less than 18-gauge corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inches. Reinforce top, either by structural angles or by rolling top over 1/4-inch steel rod, provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

B. Pipe Sleeves: Provide pipe sleeves of one of the following:
   1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gauges: 3 inches and smaller, 20-gauge; 4 inches to 6 inches, 16-gauge; over 6 inches, 14-gauge.
   2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
   3. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe, remove burrs.

C. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:
   1. Lead and Oakum: Caulked between sleeve and pipe.
   2. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mechanical sleeve seals which may be incorporated in the work include, but are not limited to following:
   Thunderline Corp.

2.03 VALVES

A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.04 GATE VALVES

A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

B. Comply with the following standards.
1. Cast-Iron Valves: MSS SP-70.
2. Bronze Valves: MSS SP-80.
3. Steel Valves: ANSI B16.34.

C. For Domestic Water Service:
1. Threaded Ends 2 inches and smaller: Class 150, bronze body, union bonnet, rising stem, solid wedge, NIBCO T-111-LF (gate valves only).
2. Flanged Ends 2-1/2 inches and larger: Class 125, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge, Milwaukee F-2885M.

D. For Fire Protection Service:
1. Threaded Ends 2 inches and smaller: Class 200, bronze body, yoke bonnet, rising stem, OS&Y, solid wedge, UL/FM approved, Stockham B-133.
2. Flanged Ends 2-1/2 inches and larger: Class 200, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL/FM approved, Stockham G-634.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gate valves which may be incorporated in the work include, but are not limited to, the following:
1. Milwaukee Valve Company.
2. Nibco Valve Company.
3. Stockham Valves and Fittings, Inc.

2.05 GLOBE VALVES

A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

B. Composition Discs: Where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut. For metal seated globe valves, provide hardened stainless-steel disc and seat ring.

C. Comply with the following standard:
1. Cast-Iron Valves: MSS SP-85.
2. Bronze Valves: MSS SP-80.
3. Steel Valves: ANSI B16.34.

D. For Domestic Water Service:
1. Threaded Ends 2 inches and smaller: Class 150, bronze body, union bonnet, rising stem, composition disc, Milwaukee 590T.
2. Flanged Ends 2-1/2 inches and larger: Class 125, iron body, bronze trimmed, bolted bonnet, rising stem, OS&Y, renewable seat and disc, Milwaukee F2981.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering globe valves which may be incorporated in the work include, but are not limited to, the following:
   1. Milwaukee Valve Company.
   2. Nibco Valve Company.
   3. Stockham Valves and Fittings, Inc.

2.06 DRAIN VALVES

A. For Low Pressure Drainage Service:
   1. Threaded Ends 2 Inches and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4-inch hose outlet connection, Milwaukee 1152M.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following:
      a. Milwaukee Valve Company.
      b. Nibco Valve Company.
      c. Stockham Valves and Fittings, Inc.

2.07 BALL VALVES

A. General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

B. Comply with the following standards:
   1. Steel Valves: ANSI B16.34.

C. For Domestic Water Service:
   1. Threaded Ends 2 inches and smaller: Class 125, bronze 2-piece body, bronze ball, bronze stem, Milwaukee BA-500.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ball valves which may be incorporated in the work include, but are not limited to the, the following:
   1. Milwaukee Valve Company.
   2. Nibco Valve Company.
   3. Stockham Valves and Fittings, Inc.

2.08 SWING CHECK VALVES

A. General: Construct pressure containing parts of valves as follows:
   1. Bronze Valves, 125 or 150 psi: ANSI/ASTM B62.
   2. Metallic Seated Bronze Valves, 200 or 300 psi: ANSI/ASTM B61.
   3. Iron Body Valves: ANSI/ASTM A126, Grade B.

B. Comply with MSS SP-71 for design, workmanship, material, and testing.

C. Construct valves of pressure castings free of any impregnating materials.

D. Construct valves of bronze, regrinding, with seating angle 40 degrees to 45 degrees, unless composition disc is specified.

E. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.

F. Construct disc and hanger as separate parts, with disc free to rotate.

G. Support hanger pins on both ends by removable side plugs.

H. For Domestic Water Service:
   1. Threaded Ends 2 inches and smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc, Milwaukee UP 509.
   2. Flanged Ends 2-1/2 inches and larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast-bronze disc, Milwaukee 2974A.

I. For Fire Protection System:
   1. Threaded Ends 2 inches and smaller: Class 200, bronze body, bolted cap, horizontal swing, composition disc, UL listed, Stockham B-305-B.
   2. Flanged Ends 2-1/2 inches and larger: Class 2005, iron body bronze mounted, bolted cap, horizontal swing, malleable iron disc, UL/FM approved, Stockham G-939.

J. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to, the following:
   1. Milwaukee Valve Company.
   2. Nibco Valve Company.
   3. Stockham Valves and Fittings, Inc.

2.09 VALVE FEATURES

A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1.

B. Bypass: Comply with MSS SP-45, and except as otherwise indicated provide manufacturer's standard bypass piping and valving.

C. Drain: Comply with MSS SP-45, and provide threaded pipe plug complying with Division-22 "Pipe, Tube, and Fittings" section.

D. Flanged: Valve flanges complying with ANSI B16.5 (steel) or ANSI B16.24 (bronze).

E. Threaded: Valve ends complying with ANSI B2.1.

F. Butt-Welding: Valve ends complying with ANSI B16.25.

G. Flangeless: Valve bodies manufactured to fit between flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

H. Wafer: Flangeless valves.

I. Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry.

J. Non-Metallic Disc: Non-metallic material selected for service indicated in accordance with manufacturer's published literature.

K. Renewable Seat: Design seat of valve with removable disc, and assembly valve so disc can be replaced when worn.

L. Extended Stem: Increase stem length by 2 inches minimum, to accommodate insulation applied over valve.

M. Mechanical Actuator: Factory-fabricated gears, gear enclosure, external chain attachment, and chain designed to provide mechanical advantage in operating valve.

N. Bonnet: Part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts, union, or welding.

O. Solid Wedge: One-piece tapered disc in gate valve, designed for contact on both sides.

P. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.

2.10 PLUG VALVES (COCKS)

A. Valve body shall be screw pattern, iron, except that sizes 1-1/4 inches through 2 inches shall be semi-steel, rated for 125 psig, non-shock W.O.G. operating pressure.

B. Plug shall be tapered, lubricated brass with square head operator.

C. APPROVED MANUFACTURERS
   1. 1-inch and smaller - A. Y. McDonnel Manufacturing Company #10686.
   2. 1-1/4 inches through 1-1/2 inches - Nordstrom #114.
   3. 2-1/2 inches and larger - Nordstrom #115.
   4. Architect Approved.

2.11 PRESSURE RELIEF VALVES

A. Body: Bronze or iron with testing lever.

B. Trim: Bronze or stainless steel.

C. Construction: Comply with ASME Code for Pressure Vessels, Section VIII and shall bear ASME stamp.

D. Maximum Permissible over Pressure: 25 percent (water).

E. APPROVED MANUFACTURERS
   1. Bell and Gossett.
   2. McDonnell Miller.
   3. Kunkle Valve Company.

2.12 PRESSURE REDUCING VALVES

A. Body: Cast iron.

B. Trim: Bronze.

C. Rating: 125 psig working pressure at 200 degrees F.

D. Operator: Spring loaded diaphragm with adjustable range.

E. Diaphragms and Disc: Nitrile.

F. Pressure Reducing Valves - Water Service:
1. Spence Regulators - Type D 34.
2. Watts Regulators.
3. Architect Approved.

2.13 BACK FLOW PREVENTERS

A. Reduced pressure type. Rated 175 psig at 140 degrees F, manufactured in the United States of America.

B. Body:
1. Bronze construction.
2. Bronze body test cocks.
3. NPT body connections.
4. Non-rising stem gate valves.

C. Check Valve:
1. Celcon seats.
2. Rubber check valve.

D. Relief Valve:
1. Stainless steel seat.
2. Stainless steel shaft and flange bolts.

E. Approved Manufactures
1. Watts Regulator Series 909-SAG.
2. Wilkins Regulators.
3. Febco.

2.14 HORIZONTAL-PIPING HANGERS AND SUPPORTS

A. General: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

B. Adjustable Steel Clevises: MSS Type 1.

C. Steel Double Bolt Pipe Clamps: MSS Type 3.

D. Adjustable Swivel Pipe Rings: MSS Type 6.

E. Split Pipe Rings: MSS Type 11.

F. Extension Split Pipe Clamps: MSS Type 12.

G. Pipe Saddle Supports: MSS Type 36, including steel pipe base support and cast-iron floor flange.

H. Pipe Stanchion Saddle: MSS Type 37, including steel pipe base support and cast-iron floor flange.

I. Adjustable Pipe Saddle Supports: MSS Type 38 including steel pipe base support and cast-iron floor flange.

J. Single Pipe Rolls: MSS Type 41.

K. Adjustable Roller Hangers: MSS Type 43.

2.15 VERTICAL-PIPING CLAMPS

A. General: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

B. Two-Bolt Riser Clamps: MSS Type 8.

C. Four-Bolt Riser Clamps: MSS Type 42.

2.16 HANGER-ROD ATTACHMENTS

A. General: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

B. Steel Turnbuckles: MSS Type 13.

C. Swivel Turnbuckles: MSS Type 15.

D. Malleable Iron Sockets: MSS Type 16.

E. Steel Weldless Eye Nuts: MSS Type 17.

2.17 BUILDING ATTACHMENTS

A. General: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

B. Concrete Inserts: MSS Type 18.

C. Top Beam C-Clamps: MSS Type 19.

D. Side Beam or Channel Clamps: MSS Type 20.

E. Center Beam Clamps: MSS Type 21.

F. C-Clamps: MSS Type 23.

G. Top I-Beam Clamps: MSS Type 25.

H. Side I-Beam Clamps: MSS Type 27.

I. Steel I-Beam Clamps with Eye Nut: MSS Type 28.

J. Steel WF-Beam Clamps with Eye Nut: MSS Type 29.

K. Malleable Beam Clamps: MSS Type 30.

L. Steel Brackets: One of the following for indicated loading:
Light Duty: MSS Type 31.
Medium Duty: MSS Type 32.
Heavy Duty: MSS Type 33.

2.18 SADDLES AND SHIELDS

A. General: Except as otherwise indicated, provide saddles or shields for piping hangers and supports, factory-fabricated, for all insulated piping. Side saddles and shields for exact fit to mate with pipe insulation.

B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.

C. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.19 MANUFACTURERS OF HANGERS AND SUPPORTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hangers and supports which may be incorporated in the work include, but are not limited to the following:
C & S Mfg. Corp.
Carpenter and Patterson, Inc.
Elcen Metal Products Co.
F & S Central Mfg. Corp.
ITT Grinnell Corp.

2.20 MISCELLANEOUS MATERIALS

A. Metal Framing: Provide products complying with NEMA Std. ML 1.

B. Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A36.

C. Cement Grout: Portland cement (ANSI/ASTM C150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3 parts sand, by volume, with minimum amount of water required for placement and hydration.

D. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for load required; weld steel in accordance with AWS standards.

E. Pipe Guides: Provide factory-fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two-section outer cylinder and base with a two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), by cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

PART 3 EXECUTION

3.01 INSTALLATION OF MANUFACTURED PIPING SPECIALTIES

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

B. Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2 inches and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

1. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment.
   Pumps.
   Steam traps serving steam main drips.
   Temperature control valves.
   Pressure reducing valves.
   Temperature or pressure regulating valves.

C. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

3.02 INSTALLATION OF FABRICATED PIPING SPECIALTIES

A. Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1 inch drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

B. Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe

sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface except floor sleeve. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

1. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
2. Install iron-pipe sleeves at exterior penetrations, both above and below grade.
3. Install steel-pipe sleeves except as otherwise indicated.

C. Sleeve Seals: Install in accordance with the following:

1. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

3.03 INSTALLATION OF VALVES

A. General: Except as otherwise indicated, comply with the following requirements.

1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.

B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

C. Applications Subject to Shock: Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

D. Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator. Install bronze valves in steam and condensate service and in other services where corrosion is indicated or can be expected to occur.

E. Mechanical Actuators: Install mechanical actuator with chain operators where indicated, and where valves 4" and larger are mounted more than 7'-0" above floor in mechanical rooms, boiler rooms; and where recommended by valve manufacturer because of valve size, pressure differential or other operating condition making manual operation difficult.

F. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections.

1. Pipe Size 2 inches and smaller: One of the following, at Installer's option:
   a. Threaded valves.
   b. Grooved-end valves (Fire Protection Only).
   c. Flanged valves.
2. Pipe Size 2-1/2 inches and larger: One of the following, at Installer's option:

a. Grooved-end valves (Fire Protection Only).
b. Flanged valves.

G. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.

H. Non-Metallic Disc: Limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

I. Renewable Seats: Select and install valves with renewable seats except where otherwise indicated.

J. Fluid Control: Except as otherwise indicated, install, gate, ball, globe and butterfly valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe or butterfly valve.

K. Installation of Check Valves:
1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.
2. Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward, position for proper direction of flow.
3. Vertical Lift Check Valve: Install in vertical piping line with upward flow with stem vertically upward.
4. Spring Loaded Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward, position for proper direction of flow.

3.04 INSTALLATION OF BACKFLOW PREVENTERS

A. Install backflow preventers where shown on the plans with elbow and air gap, and as may be required to prevent cross contamination of potable water systems.

3.05 PREPARATION

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

B. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.06 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments at required locations, within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-59. Install additional building attachments where support is required for additional

concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.07 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items.

1. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
2. Support fire-water piping independently of other piping.
3. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

B. Provisions for Movement:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion bends and similar units.
2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

C. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install galvanized coated protective shields. Install Foam-Glas insulation saddles.
3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

3.08 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximum recommended by manufacturer for each unit.

D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.09 ADJUSTMENT OF HANGERS AND SUPPORTS

A. Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.10 EQUIPMENT BASES

A. Concrete housekeeping bases will be provided as work of Division 3. Furnish to Contractor, scaled layouts of all required b bases with dimensions of bases, and location to column center-lines. Furnish templates, anchor bolts, and accessories, necessary for base construction.

B. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands. Structural steel stands to be supported from housekeeping pad bases. Steel supports shall not be allowed to be in direct contact with slab floors.

END OF SECTION

SECTION 22 3000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters.

B. Circulating Pumps.

C. Sump Pumps.

D. Domestic Booster Pumps.

1.02 RELATED SECTIONS

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0553 – Identification for Plumbing Piping

C. Section 22 0548 – Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 22 1005 – Plumbing Piping.

E. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES

A. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.

B. ASME Section VIIID - Pressure Vessels; Boiler and Pressure Vessel Codes.

C. ANSI/NFPA 30 - Flammable and Combustible Liquids Code.

D. ANSI/NFPA 54 - National Fuel Gas Code.

E. ANSI/NFPA 70 - National Electrical Code.

F. ANSI/NEMA 250 - Enclosure for Electrical Equipment (1000 Volts Maximum).

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 22 0500.

B. Shop Drawings:
   1. Include heat exchanger dimensions, size of tappings, and performance data.
   2. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

C. Product Data:
   1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.

2. Provide electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions.

1.05 OPERATION AND MAINTENANCE DATA:

A. Submit under provisions of Division 01 and Section 22 05 00.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with Arkansas State Plumbing Code.

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
1. National Sanitation Foundation (NSF).
2. American Society of Mechanical Engineers (ASME).
3. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
4. National Electrical Manufacturers' Association (NEMA).
5. Underwriters Laboratories (UL).

D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.07 REGULATORY REQUIREMENTS

A. Conform to AGA, NSF, NBBPVI, ANSI/NFPA 54, ANSI/NFPA 58, ANSI/NFPA 70, ANSI/UL 174, and ANSI/UL 1453 requirements for water heaters.

B. Conform to ASME Section VIIID for manufacture of pressure vessels for heat exchangers.

C. Conform to ASME Section VIIID, ANSI/NFPA 30, and ANSI/NFPA 31 for tanks.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 22 05 00.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

A. Provide one year warranty under provisions of hereinafter set forth.

B. Warranty: Include coverage of domestic water heaters and submersible sump pumps.

PART 2 PRODUCTS

SEE DRAWINGS FOR WATER HEATER, CIRCULATING PUMPS AND SUMP PUMP SPECIFICATIONS.

DOMESTIC BOOSTER PUMPS (X3):

DOMESTIC WATER BOOSTER PUMP (BP-1) AT ACADEMIC BUILDING

2.01 PUMPS AND MOTORS

Pumps shall be **Grundfos NSF-61 approved**, series **CR**, cast iron, stainless fitted, mechanical seal vertical multistage centrifugal type each coupled to a **3600 RPM, 460 Voltage, 3 Phase, 60 Hz**, ODP premium efficiency motor.
Pump No. **1,2,3** shall be a **Model CR64-2, 335 GPM at 168' TDH, 25 HP (each)**

2.02 VALVES

Isolation Valves: **4**" Individual pump suction and discharge valves shall be NSF 61 certified lug style butterfly valve(s) with gear operator(s). Provide a **4**" wafer style non-slam check valve NSF 61 certified on the discharge of each pump.

2.03 OVER-TEMPERATURE PROTECTION

Each pump shall be equipped with an individual combination type non-electric temperature probe and purge assembly with PRV on Purge line

2.04 POWER AND CONTROLS

Provide UL Listed, Nema 1, **TIGER'S EYE Mark V** Solid State, Power and Control Panel consisting of:

- UL/C-UL 508 Label
- Single point power connection
- Through door control power disconnect with safety interlock to prevent door from being opened while in ON position.
- Fused 120 V AC control voltage transformer
- Fused 24 V DC power supply, 1 Watt.
- Suction and system pressure transducers
  - All wetted parts are to be stainless steel.
  - 4-20 mA signal with a minimum accuracy of ±1%.
- Micro Controller: PLC with non-volatile memory (battery backup not required)
- **TIGERFLOW "TAP" Technology ASHRAE 90.1 compliant**
- **Tuning – TIGERFLOW Stepped Proportional Response**
- Operator interface: 6-inch color scale touch screen HMI (Human Machine Interface) including but not limited to the following:
  - Main Screen with the following features:
    - Individual pump HOA (Hand – Off – Auto) switches
    - Pump run indication, including current % speed
    - Pump Failure indication
    - Current pressures readings in psig (suction and system)
    - Current flow in GPM (if flowmeter specified)
    - Adjustable manual (hand) speed setting
    - Direct access to menu screen
  - Menu screen providing direct access to all system settings and status screens
  - Pump settings screen displays current settings and allows user changes
    - Lead and lag pump start and stop pressures, psig.

        - Lead and lag pump ON and OFF delay times, seconds
    - Alarm settings screen displays current settings for all alarms and allows user changes.
        - Low suction alarm settings
            - Low suction pressure, psig
            - ON and OFF delays, seconds
            - Manual or automatic reset
        - Low system alarm settings
            - Low system pressure, psig
            - ON and OFF delays, seconds
            - Manual or automatic reset
        - High system alarm settings
            - High system pressure, psig
            - ON and OFF delays, seconds
            - Manual or automatic reset
        - High suction economy mode
            - Economy mode suction pressure, psig
            - Economy mode enable / disable
            - ON and OFF delays, seconds
    - Separate Alarm Silence and Alarm Reset buttons
    - Current system status screen displays:
        - Pump(s) currently running
        - Active alarms and warning messages
    - System event history screen displays a minimum of the last 10 system events, including pump start /stops, alarm conditions and alarm acknowledgements.
    - Pump run time screen displays the total operating time for each pump. Provide individual resets for each pump run time
    - Lead pump alternation options will include:
        - Automatic alternation on lead pump shutdown.
        - Manual alternation when operator touches alternate button
        - Timed alternation:
            - Daily (user specified time of day)
            - Weekly (user specified day of week and time of day)
            - Monthly (first week of month on user specified day of week and time of day)
    - -Multi Level Security
        - 8 Password protected security levels (field changeable passwords)
- Common alarm relay provides dry contacts for customer monitoring.
- Alarm horn, 85 db, annunciates all alarm conditions.

2.05 VARIABLE FREQUENCY DRIVES (VFD)

Each drive will have individual disconnects and short circuit protection. Drive manufacturer must provide a two-year minimum warranty.

Drives will be configured to provide the following operating features:

- Drive keypad will have manual, off and automatic mode selection and will accessible to operators without opening an enclosure.
- When in automatic, drive will run upon closure of the respective run permissive contact
- When in automatic and with a run permissive signal, drive speed will respond to a 0-10 V DC speed reference signal from pump controller.
- Drive will provide a limited number of automatic resets for fault conditions and will maintain a history of faults.

2.06 HYDRO-PNEUMATIC TANK

Provide a Section VIII, ASME Code, National Board stamped, hydro-pneumatic tank. Tank shall be provided complete with a NSF approved replaceable bladder, bottom connection, air fill valve, tank drain valve and gauge. Tank shall be: Model TF-132E, 132-gallon, 150 PSI.

The hydro-pneumatic tank shall be adjacent to system with feed line and full port ball valve on discharge header (remote mounted as shown per drawings).
Note: Adjacent mounting requires contractor field connection.

2.07 PUMP SEQUENCING

- PRESSURE SEQUENCING

Lag pump(s) are staged ON and OFF based on pressure only. When system pressure falls to a lag pump start pressure for the defined on-delay time period, lag pump starts. If system pressure continues to fall, addition lag pumps (if available) will start as pressure falls to the respective start pressure settings. Pumps are stage OFF, one at a time, in reverse order of start as system pressure setpoint is maintained for the pump OFF-delay time period.

DOMESTIC WATER BOOSTER PUMP (BP-1) AT FIELD HOUSE

2.01 PUMPS AND MOTORS

Pumps shall be **Ebara NSF-61 certified**, series **EVMSU**, stainless steel, mechanical seal, end suction centrifugal type each close coupled to a **3600 RPM, 460 Voltage, 3 Phase, 60 Hz**, ODP premium efficiency motor.
Pump No. **1,2,** shall be a **Model 20-2, 100 GPM at 104' TDH, 5 HP (each)**

2.02 VALVES

Isolation Valves: **2**" Individual pump suction and discharge valves shall be NSF 61 certified lug style butterfly valve(s) with gear operator(s). Provide a **2**" wafer style non-slam check valve NSF 61 certified on the discharge of each pump.

2.03 OVER-TEMPERATURE PROTECTION

Each pump shall be equipped with an individual combination type non-electric temperature probe and purge assembly with PRV on Purge line

2.04 POWER AND CONTROLS

Provide UL Listed, Nema 1, **TIGER'S EYE Mark V** Solid State, Power and Control Panel consisting of:

- UL/C-UL 508 Label
- Single point power connection
- Through door control power disconnect with safety interlock to prevent door from being opened while in ON position.
- Fused 120 V AC control voltage transformer
- Fused 24 V DC power supply, 1 Watt.
- Suction and system pressure transducers
  - All wetted parts are to be stainless steel.
  - 4-20 mA signal with a minimum accuracy of ±1%.
- Micro Controller: PLC with non-volatile memory (battery backup not required)
- **TIGERFLOW "TAP" Technology ASHRAE 90.1 compliant**
- **Tuning – TIGERFLOW Stepped Proportional Response**

- Operator interface: 6-inch color scale touch screen HMI (Human Machine Interface) including but not limited to the following:
  - Main Screen with the following features:
    - Individual pump HOA (Hand – Off – Auto) switches
    - Pump run indication, including current % speed
    - Pump Failure indication
    - Current pressures readings in psig (suction and system)
    - Current flow in GPM (if flowmeter specified)
    - Adjustable manual (hand) speed setting
    - Direct access to menu screen
  - Menu screen providing direct access to all system settings and status screens
  - Pump settings screen displays current settings and allows user changes
    - Lead and lag pump start and stop pressures, psig.
    - Lead and lag pump ON and OFF delay times, seconds
  - Alarm settings screen displays current settings for all alarms and allows user changes.
    - Low suction alarm settings
      - Low suction pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - Low system alarm settings
      - Low system pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - High system alarm settings
      - High system pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - High suction economy mode
      - Economy mode suction pressure, psig
      - Economy mode enable / disable
      - ON and OFF delays, seconds
  - Separate Alarm Silence and Alarm Reset buttons
  - Current system status screen displays:
    - Pump(s) currently running
    - Active alarms and warning messages
  - System event history screen displays a minimum of the last 10 system events, including pump start /stops, alarm conditions and alarm acknowledgements.
  - Pump run time screen displays the total operating time for each pump. Provide individual resets for each pump run time
  - Lead pump alternation options will include:
    - Automatic alternation on lead pump shutdown.
    - Manual alternation when operator touches alternate button
    - Timed alternation:
      - Daily (user specified time of day)
      - Weekly (user specified day of week and time of day)
      - Monthly (first week of month on user specified day of week and time of day)
  - -Multi Level Security
    - 8 Password protected security levels (field changeable passwords)
- Common alarm relay provides dry contacts for customer monitoring.
- Alarm horn, 85 db, annunciates all alarm conditions.

2.05 VARIABLE FREQUENCY DRIVES (VFD)

Each drive will have individual disconnects and short circuit protection. Drive manufacturer must provide a two-year minimum warranty.

Drives will be configured to provide the following operating features:

- Drive keypad will have manual, off and automatic mode selection and will accessible to operators without opening an enclosure.
- When in automatic, drive will run upon closure of the respective run permissive contact
- When in automatic and with a run permissive signal, drive speed will respond to a 0-10 V DC speed reference signal from pump controller.
- Drive will provide a limited number of automatic resets for fault conditions and will maintain a history of faults.

2.06 HYDRO-PNEUMATIC TANK

Provide a Section VIII, ASME Code, National Board stamped, hydro-pneumatic tank. Tank shall be provided complete with a NSF approved replaceable bladder, bottom connection, air fill valve, tank drain valve and gauge. Tank shall be: Model TF-132E, 132 gallon, 150# ASME Code Vessel.

The hydro-pneumatic tank shall be adjacent to system with feed line and full port ball valve on discharge header (remote mounted as shown per drawings).
Note: Adjacent mounting requires contractor field connection.

2.07 PUMP SEQUENCING

- PRESSURE SEQUENCING

Lag pump(s) are staged ON and OFF based on pressure only. When system pressure falls to a lag pump start pressure for the defined on-delay time period, lag pump starts. If system pressure continues to fall, addition lag pumps (if available) will start as pressure falls to the respective start pressure settings. Pumps are stage OFF, one at a time, in reverse order of start as system pressure setpoint is maintained for the pump OFF-delay time period.

DOMESTIC WATER BOOSTER PUMP (BP-1) AT CONCESSION

2.01 PUMPS AND MOTORS

Pumps shall be **Ebara NSF-61 certified**, series **3U**, stainless steel, mechanical seal, end suction centrifugal type each close coupled to a **3600 RPM, 460 Voltage, 3 Phase, 60 Hz**, ODP premium efficiency motor. Pump No. **1,2,** shall be a **Model 3U-40-125B-5HP, 110 GPM at 99' TDH, 5 HP (each)**

2.02 VALVES

Isolation Valves: **2.5**" Individual pump suction and discharge valves shall be NSF 61 certified lug style butterfly valve(s) with gear operator(s). Provide a **2.5**" wafer style non-slam check valve NSF 61 certified on the discharge of each pump.

2.03 OVER-TEMPERATURE PROTECTION

Each pump shall be equipped with an individual combination type non-electric temperature probe and purge assembly with PRV on Purge line

2.04 POWER AND CONTROLS

Provide UL Listed, Nema 1, **TIGER'S EYE Mark V** Solid State, Power and Control Panel consisting of:

- UL/C-UL 508 Label
- Single point power connection
- Through door control power disconnect with safety interlock to prevent door from being opened while in ON position.

- Fused 120 V AC control voltage transformer
- Fused 24 V DC power supply, 1 Watt.
- Suction and system pressure transducers
  - All wetted parts are to be stainless steel.
  - 4-20 mA signal with a minimum accuracy of ±1%.
- Micro Controller: PLC with non-volatile memory (battery backup not required)
- **TIGERFLOW "TAP" Technology ASHRAE 90.1 compliant**
- **Tuning – TIGERFLOW Stepped Proportional Response**
- Operator interface: 6-inch color scale touch screen HMI (Human Machine Interface) including but not limited to the following:
  - Main Screen with the following features:
    - Individual pump HOA (Hand – Off – Auto) switches
    - Pump run indication, including current % speed
    - Pump Failure indication
    - Current pressures readings in psig (suction and system)
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      - Low suction pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - Low system alarm settings
      - Low system pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - High system alarm settings
      - High system pressure, psig
      - ON and OFF delays, seconds
      - Manual or automatic reset
    - High suction economy mode
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      - Daily (user specified time of day)
      - Weekly (user specified day of week and time of day)
      - Monthly (first week of month on user specified day of week and time of day)

- -Multi Level Security
    - 8 Password protected security levels (field changeable passwords)
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- Alarm horn, 85 db, annunciates all alarm conditions.

2.05 VARIABLE FREQUENCY DRIVES (VFD)

Each drive will have individual disconnects and short circuit protection. Drive manufacturer must provide a two-year minimum warranty.

Drives will be configured to provide the following operating features:

- Drive keypad will have manual, off and automatic mode selection and will accessible to operators without opening an enclosure.
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- Drive will provide a limited number of automatic resets for fault conditions and will maintain a history of faults.

2.06 HYDRO-PNEUMATIC TANK

Provide a Section VIII, ASME Code, National Board stamped, hydro-pneumatic tank. Tank shall be provided complete with a NSF approved replaceable bladder, bottom connection, air fill valve, tank drain valve and gauge. Tank shall be: Model TF-132E, 132-gallon, 150 PSI.

The hydro-pneumatic tank shall be adjacent to system with feed line and full port ball valve on discharge header (remote mounted as shown per drawings).
Note: Adjacent mounting requires contractor field connection.

2.07 PUMP SEQUENCING

- PRESSURE SEQUENCING

Lag pump(s) are staged ON and OFF based on pressure only. When system pressure falls to a lag pump start pressure for the defined on-delay time period, lag pump starts. If system pressure continues to fall, addition lag pumps (if available) will start as pressure falls to the respective start pressure settings. Pumps are stage OFF, one at a time, in reverse order of start as system pressure setpoint is maintained for the pump OFF-delay time period.

PART 3 EXECUTION

3.01 INSTALLATION OF HOT WATER HEATERS

A. Install water heaters and storage tanks as detailed on Drawings, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Set units on housekeeping pads as shown on Drawings, orient so controls and devices needing service and maintenance have adequate access. Level and plumb unit.

C. Connect hot and cold-water piping to units with shutoff valves and dielectric unions.

D. Start-up and test water heating system in accordance with manufacturer's start-up instructions. Factory start shall be provided.

E. Coordinate with plumbing piping and related electrical work to achieve operating system.

F. Install tanks in accordance with manufacturer's instructions.

G. Pipe relief valves and drains to nearest floor drain or as noted on drawings.

3.02 INSTALLATION OF HOT WATER CIRCULATOR PUMP

A. Install circulator where shown on the plans with aqua-stat, valves, piping and supports aligned true and complete.

B. Repair any equipment or piping system within the area which has been damaged due to reworking of existing systems.

3.03 PUMP INSTALLATION

A. Provide line sized isolating valve and strainer on suction and line sized, soft- seated check valve and balancing valve on discharge.

B. Support piping adjacent to pump so that no weight is carried on pump casings.

C. Ensure pumps operate at specified system fluid temperature without vapor binding and cavitation are non-overloading in parallel or individual operation, and operated with 25 percent of midpoint of published maximum efficiency curve.

D. FACTORY FABRICATION

Provide each system as a complete package system on an open structural steel mounting frame, piped, tubed, mounted and wired. Unit shall be factory primed and painted with machine grade finish coat. All welding shall be performed by ASME Section 9 certified welders. System shall be (Horizontal) (Vertical) construction. Branches, Suction and discharge headers shall be: Schedule 40, 304 stainless steel 8" grooved connections. System manufacturer shall isolate all ferrous from all non-ferrous materials.

E. FACTORY TEST

The package shall be electrically and hydrostatically tested before shipment, in addition, each system shall be factory tested from 0-100% of flow and pressure.

F. SITE COMMISSIONING AND TRAINING

The factory authorized local representative shall provide (4) hours of startup and field training.

G. WARRANTY

Each **TIGERFLOW** system shall be warranted for a period of (18) months from date of shipment or (12) months from date of startup, whichever occurs first.

3.04 GUARANTEE

A. The entire installation shall be guaranteed for one (1) year against defective equipment, materials and workmanship beginning on signing of substantial completion form.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES AND TRIM

PART 1 GENERAL

1.01 SCOPE

A. Includes:
   1. Plumbing fixtures complete with associated trim and fittings, necessary to make a complete installation from wall or floor connections to rough piping and accessories.

B. All fixtures shall be caulked between the fixture and the mounting surface with white or clear Silicone rubber non-absorbent caulking component.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 22 0500 – Common Work Results for Plumbing Piping and Equipment.

B. Section 22 0548 – Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 22 1005 – Plumbing Piping.

D. Section 22 3000 – Plumbing Equipment.

1.03 QUALITY ASSURANCE

A. Die-cast zinc alloy will not be accepted.

B. All faucets, stops, and traps shall be of the same manufacturer unless herein noted otherwise.

C. Corrosion-resistant steel (CRS).
   1. CRS flat products shall conform to not less than chemical composition requirements of any 300 series steel specified in ASTM A276.
   2. Exposed surfaces shall have standard polish (ground and polished) equal to Finish No. 4 as specified in NAAMM.

D. All enameled ironware shall be acid resisting.

E. All fixtures shall be new and best of their respective kinds. They shall be non-absorbent throughout and free from waves, kiln marks or discoloration.

F. All surfaces coming in contact with walls, floors, or surface of other fixtures shall be ground truly flat and shall be bedded with fine dental plaster before being caulked to wall with silicone sealant.

G. Job must be turned over to the Owner with all fixtures clean and free from damage. All fixtures including service sinks shall be protected during construction with application of material sufficient to prevent use and damage by personnel and equipment.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 30 00 and Section 22 0500.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Installation Instructions.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 01300 and Section 22 0500.

B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 22 0500.

B. Accept fixtures on site in factory packaging. Inspect for damage.

C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as instructed by the manufacturer.

B. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories and sinks.

1.08 WARRANTY

A. Provide year warranty under provisions of Section 22 0500.

1.09 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the test by the basic designation only.

1. American National Standards (ANSI):
   A112.1.2-42.....Air Gaps in Plumbing System
   A112.6.1M-79.....Supports for Off-the-Floor Plumbing Fixtures for Public Use
   A112.18.1M-79....Finished and Rough Brass Plumbing Fixture Fittings
   A112.19.1M-79....Enameled Cast Iron Plumbing Fixtures
   A112.19.2-82.....Vitreous China Plumbing Fixtures
2. American Society for Testing and Materials (ASTM):
   A276-83.....Stainless and Heat-Resisting Steel Bars and Shapes
3. National Association of Architectural Metal Manufacturers (NAAMM):
   Metal Finishes Manual.

PART 2 PRODUCTS

2.01 GENERALLY

A. This contractor shall furnish and install complete all fixtures shown on the plans and hereinafter specified.

B. All fixtures shall be new and best of their respective kinds. They shall be non-absorbent throughout and free from waves, kiln marks or discoloration.

C. All surfaces coming in contact with walls, floors or surface of other fixtures shall be ground truly flat and shall be bedded with fine dental plaster before being caulked to wall with silicone sealant.

D. All fixtures shall have water hammer arresters equal to Zurn or Wade, installed in their water supplies as shown on Drawings or as recommended by the shock absorber manufacturer.

E. Provide polished chromium plated, heavy brass lock-shield loose key or screwdriver pattern angle stops, straight stops, or stops integral with faucet, with each compression type faucet whether specifically called for or not. Locate stops centrally above or below fixture in accessible location. Furnish keys for lock-shield stops to Owner upon completion of installation. All supplies shall be I.P.S. brass.

F. Traps shall be two-piece chrome plated cast brass P-traps with cleanout and 17-gauge tubing outlet with escutcheon.

G. All escutcheons on supplies and wastes shall be heavy chrome plated cast brass set screw type.

H. All faucets throughout shall have removable units comprising all the wearing parts.

I. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

J. Unless specifically specified otherwise, all fixture trim, stops, and traps shall be of the same manufacturer.

K. Protect fixtures against use and damage during construction in a manner approved by the Architect. Job must be turned over to the Owner with all fixtures and trim clean and free from damage. Fixtures shall not be used during construction unless approved by the Owner and/or Architect/Engineer.

L. All sink and lavatory type plumbing fixtures to have loose key type stops and flexible supply risers (unless noted otherwise).

M. All exposed plumbing piping shall be chrome plated unless noted otherwise.

N. The Contractor must review the Architectural Drawings for exact location of plumbing fixtures and floor drains. If a plumbing fixture or floor drain is shown on the Architectural Drawings, it must be included in the Contract even if it does not appear on the Mechanical Drawings.

O. All thermostatic and pressure balancing mixing valves shall have check-stops on the hot and cold supplies.

P. All hot and cold-water supplies to plumbing fixtures or to shower heads shall have a "Drop Ell" fitting securely attached, inside wall, to prevent movement.

Q. All lavatory or sink fixtures designated for handicapped use must have insulation installed on the water supplies and P-trap equal to "Lav-Guard" by Truebro, Inc.

R. All drinking fountain bubblers shall be chrome plated brass.

S. All lavatory and urinal waste arms shall be DWV copper with cast brass adapters and wrought copper fittings.

T. All water closet flush valves that have grab bars mounted on walls behind them shall have a minimum of 1-1/2-inch flush valve pipe offset to clear grab bar. Coordinate with Architectural drawings.

U. All handicapped water closet flush valves shall be roughed-in and installed so that the flush valve control will be on the wide side of the toilet stall. Contractor shall coordinate this.

V. All water closet flush valves shall have cast wall flange with set screw, and be supplied with sweat-solder adapter kits.

W. Check millwork architectural and shop drawings. Verify exact location and size of fixtures and openings before rough-in and installation. Coordinate with millwork supplier for special cutouts, blocking, special or additional supports, etc.

X. This contractor shall furnish and install all backing for lavatories, or any equipment requiring same.

Y. Job must be turned over to the Owner with all fixtures clean and free from damage.

Z. Where water closets, lavatories or sinks are installed back-to-back, and carriers are specified, provide one carrier to serve both fixtures in lieu of individual carriers, unless noted otherwise on Drawings.

2.02 STOPS

A. Provide polished chromium plated, heavy brass lock-shield loose key or screw driver pattern angle stops, straight stops, or stops integral with faucet, with each type faucet whether specifically called for or not, including sinks in wood and metal casework, laboratory furniture and pharmacy furniture. Locate stops centrally above or below fixture in an accessible location with 6-inch minimum length chrome plated brass nipples from wall and escutcheon. Furnish keys for lock-shield stops to Owner upon completion of installation.

2.03 TRAPS

A. Two-piece chromium plated cast brass with cleanout and 17-gauge tubing outlet with cast brass set screw type escutcheon.

2.04 ESCUTCHEONS

A. All escutcheons on supplies and wastes shall be heavy pattern, chrome plated, cast brass set screw type.

2.05 FAUCETS

A. All faucets shall be provided with aerators unless specified otherwise and shall have removable units comprising all the wearing parts.

2.06 CARRIERS

A. Where water closets, lavatories or sinks are installed back-to-back, and carriers are specified, provide one carrier to serve both fixtures in lieu of individual carriers.

2.07 ORIGIN

A. Unless specifically specified otherwise, all material and products shall be manufactured in the United States of America.

2.08 FIXTURES

A. The following catalog numbers are for reference to type and quality and approved equal may be used only as noted. SEE DRAWINGS FOR PLUMBING FIXTURE SCHEDULE.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fixture Setting: Opening between fixture and floor and wall finish shall be caulked with white or clear Silicone sealants which complement the fixture color.

B. Supports and Fastening: Secure all fixtures, equipment and trimmings to partitions, walls, etc. with brass through bolts, toggle bolts, expansion bolts, or power set fasteners, as required. Exposed heads of bolts and nuts in finished rooms to be hexagonal, polished chromium plated brass with rounded tops.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Install components level and plumb secured in place with wall carriers and bolts.

3.03 ADJUSTING

A. Adjust work under provisions of Division 1.

B. Provide adjustment of all stops, valves faucets, etc., for intended water flow rates to fixtures as required to eliminate excessive splashing, noise, or overflow.

C. Where water closet waste pipe has to be offset due to beam interference, provide correction and/or additional piping necessary to eliminate relocation of water closet.

3.04 CLEANING

A. At completion of all work, fixtures, exposed materials, accessible chases and equipment shall be thoroughly cleaned of all manufacture's labels, papers, paint, paste, and other foreign material.

3.05 FIXTURE HEIGHTS

A. Install fixtures to heights above finished floor as herein specified and indicated on the Architectural drawings. Architectural drawings shall rule where discrepancies occur.

END OF SECTION

SECTION 22 6600
CHEMICAL WASTE SYSTEMS FOR LABORATORY FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for acid waste and vent piping complete with all necessary connections and accessories inside and the building to connect new and relocated Laboratory equipment, sinks, fume hoods etc.

1.02 RELATED SECTIONS

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0553 – Identification for Plumbing Piping

C. Section 22 3000 – Plumbing Equipment.

D. Section 22 4000 – Plumbing Fixtures.

E. Section 31 2316 – Excavation.

1.03 QUALITY ASSURANCE

A. Manufacturers shall be firms regularly engaged in manufacturer of plumbing piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer shall be a firm with at least 3 years of successful installation experience on projects with plumbing piping system work similar to that required for project.

C. Comply with applicable codes and standards.

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 22 05 00.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three years' experience.

PART 2 PRODUCTS

2.01 PIPE

A. Piping Above Floor - Mechanical Joint Type:

1. All lines of 1-1/2 inches and larger shall be Orion Proxylene "Blueline" polypropylene, Schedule 80 piping and fittings. Piping system shall be of a fire retardant, thermoplastic material compounded of polypropylene Type II copolymer with fire retardant additives meeting UL certification of V-2 tested under UL Subject 94 in thickness of .150 and over, ASTM D635 criteria for self-extinguishing and ASTM D2843 smoke chamber test with a maximum value less than 50. Piping shall be supplied in 10-foot lengths, cylindrical and straight, meeting tolerances in accordance with ASTM D2447-74 and factory grooved for mechanical joint systems and plain end for socket fusion systems. Fittings shall meet tolerances in ASTM D3311.
2. Pipe and fittings used in the system shall bear the registered insignia indicating manufacturer's name and type of pipe and that these items used in the system comply with ASTM D4101 (latest revision) for material conformance.
3. In horizontal installations, hangers shall be provided at every other joint except when the developed length between hangers exceeds 4'-0", they shall be provided at each joint. Hangers shall be provided at each horizontal branch connection. Hangers shall be adequate to maintain alignment and prevent sagging, and shall be placed on or immediately adjacent to the coupling. Adequate provision shall be made to prevent "shear". Where components are suspended in excess of 18 inches by means of non-rigid hangers, they shall be suitable braced against movement horizontally. Piping at ceiling or mechanical room shall be suspended from spring hangers.
4. Vertical sections and their connecting branches and components shall be secured at each stack base and at sufficiently close intervals to keep the system in alignment and to adequately support the weight of the pipe and its contents.
5. Piping shall not be anchored to restrict movement from thermal expansion incurred from chemical reaction or the inadvertent dumping of hot water into the system. Clevis type hangers shall be used in horizontal installations. When split-ring types are used, the hanger shall be sized larger than the pipe being supported to allow pipe to move. Hanger spacing shall comply with the following and hereinbefore specified:

Pipe Size	Hanger Spacing
1/2 inch	4'-0"
2 inch	4'-0"
3 inch	4'-0"
4 inch	4'-6"
6 inch	5'-0"
8 inch	5'-0"
10 inch	6'-0"
12 inch	6'-0"

6. Acid waste and vent piping above ceilings that are return air plenums shall be Duriron pipe and fittings with "MJ" mechanical joint coupling system. Acid vents shall generally be Duriron from below ceilings up through roof.

B. Piping Below Floor Grade - Socket Fusion Type:

1. All piping below the floor and extended five feet (5'-0") outside the building shall be "Blueline" polypropylene Schedule 80 pipe and fittings unless noted

otherwise. All fittings shall conform, to ASTM D4101 for material conformance.

C. Piping Exterior of Building (Below Grade) - Socket Fusion Type:
   1. Pipe and fittings (exterior of the building 5'-0") shall be "Brownline" polypropylene, Schedule 80, thermoplastic material compounded of polypropylene Type II copolymer, supplied in 10-foot lengths, cylindrical and straight meeting tolerances in accordance with ASTM D2447-74, and plain end for socket fusion system. Pipe and fittings used in the system shall bear the registered insignia indicating manufacturer's name and type of pipe and that these items used in the system comply with ASTM Standard D4101 (latest revision) for material conformance.

2.02 PIPE JOINTS

A. Mechanical Joint:
   1. The mechanical joint shall consist of Orion Proxylene "Blueline" polypropylene, Schedule 80 pipe, fittings and "**Irontite**" pipe couplings made of 24 gage type 304 stainless steel with coupling gaskets made of thermoplastic resin (having similar chemical resistance as pipe and fittings) and shall interlock with the housing assembly to make a slip free joint. Pipe and fittings shall be inserted into the sleeve and firmly seated against the center rib of shoulder of the gasket. A sound joint shall be provided in field cut lengths of pipe by having square cut ends as smooth as possible. The stainless-steel bands shall be tightened alternately and firmly until coupling bars come squarely together.

B. Fusion Joint:
   1. The fusion joint shall consist of Orion Proxylene "Blueline" polypropylene or "Brownline" polypropylene, Schedule 80 pipe and socket type fittings and made by using the Orion heat tool which encompasses heat joining of polyolefin pipe and fitting standards and practices to meet ASTM D2657.

2.03 CLEANOUTS

A. Cleanouts shall be provided at the ends and points in change of direction of all drain, soil and waste pipes and branches thereof, at the foot of each riser, at all offsets, in all horizontal runs at approximately 50-foot intervals for piping 4 inches and smaller and 100 feet for larger piping, and at other points where indicated on the plans or where required.

B. All cleanouts in connection with polypropylene pipe, except the traps and fittings on horizontal branches, shall have tapped "Y" fittings of same size as pipe up to 4 inches, and 4 inches for all larger pipe, closed with screw plugs. All other cleanouts in connection with polypropylene pipe, except those that occur in finished floor and walls, shall have heavy socket adaptors same size as pipe up to 4 inches, and 4 inches for all larger pipe, fusion joined into hub and closed with a bronze screw plug.

C. All cleanouts in finished floors shall be corrosion resistant type with membrane anchorage pan and clamping collar, scoriated square, nickel-bronze access cover, and adjustable frame manufactured from fire retardant polypropylene material conforming to ASTM D4101. Top shall have Acid Waste Cleanout (AWCO) cast in cover.

D. All cleanouts in finished walls shall be corrosion resistant type, or approved equal, with polished nickel-bronze, square access cover and AWCO cast in top. Cover shall have securing lugs which complement the construction.

E. All cleanouts on exterior piping of building shall be similar to that specified for the floor cleanout less membrane anchorage pan and clamp in collar and as detailed on the drawings for Sanitary Sewer System.

2.04 TRAPS AND DRAINS

A. P-traps shall be placed under all floor drains and where indicated in wastes, and at other points indicated on plans. P-traps shall be manufactured from fire retardant polypropylene material conforming to ASTM D4101. All plumbing fixtures and equipment, which have accessible traps, shall be provided with full union type P-trap.

B. Floor drains on acid waste system must cast iron with all wetted surfaces coated with porcelain or acid-resistant epoxy or shall be manufactured from fire retardant polypropylene material conforming to ASTM D4101. Grate, plug, funnels and covers shall be made of fiber-filled polypropylene for strength and durability. Drains shall include basket strainer and flashing clamp. Where funnel type is required, the drain strainer shall be tapped at the factory to receive the male threaded 6-inch by 9-inch oval funnel in accordance with the schedule on the drawings. See Floor drains specifications.

2.05 DRAIN PANS

A. All floor drains, except for those in concrete slab above earth fill, shall be provided with non-plasticized chlorinated polyethylene, "Chloraloy 240", brand concealed water proofing membrane as manufactured by the Noble Company of Grand Haver, Michigan. Membrane shall be medium gray in color, textured surface finish both sides, have white or black lettering continuously marked "Chloraloy 240", size 18 inches by 18 inches, turned up at least 1 inch, and meet applicable standards of ASTM. Complete installation shall be in accordance with manufacturer's recommendations.

2.06 Pipe and fittings shall be Orion Fittings, Inc. of Kansas City, Kansas. All piping system components shall be the products of one manufacturer.

2.07 NEUTRALIZING/DILUTION TANK

A. Tank shall be rotationally molded from virgin high density polyethylene conforming to ASTM D1248 for polyolefin materials. Tank shall be capable of withstanding 180 degrees F. Top shall be seamless construction with flanged top and 3/8 inch minimum thickness heavy bolt (stainless steel) down cover.

B. Variations of inlets, outlets, vents, different locations and elevation of openings as well as tank accessories (extensions, trap door, etc.) and size shall be as detailed on Drawings.

C. Limestone chips shall be 1 to 3 inches in diameter size rage and have a calcium carbonate content in excess of 90 percent.

D. The tank shall be installed inside a concrete vault – see detail.

2.08 APPROVED MANUFACTURERS

A. Orion Fittings, Inc. of Kansas City, Kansas.

B. R. G. Sloane Mfg. Co., Inc., Los Angeles, California.

C. Architect approved equal, made in the United States of America, and all piping system

components the products of one manufacturer.

PART 3 EXECUTION

3.01 Provide all specialties as set forth in these specifications.

3.02 Each fixture and appliance discharging water into the acid waste lines shall have a seal trap in connection with a complete venting system so gasses pass freely to atmosphere with no pressure of syphon condition on water seal.

3.03 Before piping is covered, conducts tests in presence of Architect and correct leaks or defective work. Do not caulk threaded work. Fill waste and vent system to roof level (a minimum of 10 feet) with water and show no leaks for two (2) hours.

3.04 Vent entire acid system to atmosphere with no cross-connection with other sewer systems. Set back vent lines so they will not pierce roof near an edge or valley.

3.05 Waste, drain and vent piping must be of sizes noted and run as indicated on the drawings, and shall be given a uniform grade of 1/4 inch per foot wherever possible, but in no case less than 1/8 inch per foot. The waste pipes shall be extended through roof. Each riser extending through the roof shall project 10 inches above roofline. Flashing shall be by roofing trade contractor. Counter flashing shall be by plumbing trade contractor. Where so shown, connect vents below roof.

3.06 Flash pipes passing through roof with 6 lb/sq. ft. lead flashing fitted around pipes and turned down into pipe 1/3 inch with turned edge hammered against pipe wall or flashing and counterflashing compatible with roofing system.

3.07 Install socket fusion type joints only (no mechanical joints) at locations in main stacks and runs within 75 feet of appliances which may dump hot water (160 degrees F plus or minus) into the system, i.e. autoclaves, dishwashers, sterilizers, etc.

3.08 Piping runs below grade shall have Type 5 bedding in that piping is laid on a minimum of 9 inches compacted sand bed and covered in 6-inch intervals of compacted sand to a minimum of 6 inches above crown of pipe is attained. Water compaction will not be allowed. Remainder of fill shall be as hereinbefore specified.

3.09 Installation uniformity shall be maintained.

END OF SECTION

SECTION 23 0500
COMMON WORK RESULTS FOR HEATING, VENTILATING AND AIR CONDITIONING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for complete heating, ventilating, and air conditioning system.

1.02 RELATED SECTIONS

A. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

B. Section 23 3100 – HVAC Ducts and Casings.

C. Division 23 – All Sections.

D. Section 31 2316 – Excavation.

1.03 SITE INSPECTION

A. Examine premises and understand the conditions which may affect the performance of work of this Division before submitting proposals for this work.

B. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

1.04 DRAWINGS

A. Mechanical drawings show the general arrangement of piping, ductwork, equipment, etc. Follow closely as actual building construction and work of other trades will permit.

B. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to the design and construction of buildings. These drawings take precedence over mechanical drawings.

C. Because of the small scale of mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structurally and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

D. Record the difference between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Architect. Return these prints to Architect after the project. These will be labeled "Contractor Revised Drawings".

1.05 SUBSTITUTIONS

A. The naming of specified items on the drawings or in the specifications is intended to establish a level of quality and performance. Substitution requests may be submitted at the time of shop drawing submittal. A review of substituted equipment or material before the Bid Date will not be considered unless otherwise specified.

B. Substitution shall be submitted as specified in Division 01.

1.06 CODE REQUIREMENTS, FEES & PERMITS

A. Perform work per applicable provisions of state and local Plumbing Code, gas ordinances, and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

B. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Architect

in writing of such differences.

C. Obtain all required permits in connection with this work under the contract and pay all fees in connection therewith. Arrange with serving utility companies for the connection to all utilities and pay all charges for the same including inspection fees and meters if required.

1.07 OPERATIONS AND MAINTENANCE MANUAL FOR MECHANICAL SYSTEMS

A. Bind two (2) Operations & Maintenance Manuals for Mechanical Systems in 3-ring, hardback binders. The spine of each binder shall have the following lettering done in silk-screen:

OPERATION AND MAINTENANCE MANUAL
TRUMANN MIDDLE SCHOOL
SYSTEMS REPLACEMENT
TRUMANN, ARKANSAS

1. Provide a master index at beginning of Manual showing items included. Include the name and phone number of the nearest supplier and Manufacturer's representative. Use plastic tab indexes for sections of Manual.
2. Step by step procedure to follow in putting each piece of mechanical equipment into operation.
3. Provide schematic control diagrams for each separate fan system, refrigeration system, heating system, control panel, etc. Each diagram shall show locations of start-stop switches, insertion thermostats, room thermostats, thermometers, fire-stats, pressure gauges, automatic valves, and refrigeration accessories. Mark correct operating settings for each control instrument on these diagrams.
4. Provide diagram for electrical control system showing the wiring of related electrical control items such as fire-stats, fuses, interlocks, electrical switches, and relays.
5. Provide drawings of each temperature control panel identifying components on the panels and their function.

B. Maintenance instructions shall include:
1. Manufacturer's maintenance instructions for each piece of mechanical equipment installed in the project. Instructions shall include the name of the vendor, installation instructions, parts numbers and lists, operations instructions of equipment and maintenance, and lubrication instructions.
2. Summary list of mechanical equipment requiring lubrication showing the name of equipment, location, and type and frequency of lubrication.
3. List of mechanical equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.

C. Air Balance and Test Run Reports.
1. Include a copy of air balance reports and certifications.
2. Include a copy of the operating test data.

D. Provide a complete set of approved shop drawing submittals as an Appendix item.

1.08 OPERATIONS AND MAINTENANCE INSTRUCTIONS

A. Instruct Owner/Owner's Representative in operation and maintenance of mechanical systems utilizing Operations and Maintenance Manual when so doing.

B. Minimum instruction periods shall be as follows:
1. Mechanical - Eight (8) hours.
2. Refrigeration - Eight (8) hours.

C. Instruction periods shall occur after pre-final inspection when systems are properly working and

before final payment is made.

D. None of these instructional periods shall overlap another.

1.09 CONTRACTOR REVISED DRAWINGS

A. The contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.

B. The exact location of all underground utility service entrances and their connections to utility mains, wellheads, loop piping, and all valves, etc., which will be concealed in the finished work shall be accurately indicated on the drawings by measured distances.

C. Upon completion of the work and before final payment, the contractor shall furnish to the Architect, one set of "contractor revised" prints, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the contract drawings.

D. The contractor shall include all addendum items and field change order information on the revised drawings. Revise all schedules shown on the drawings to reflect the actual model numbers, capacities, and electrical characteristics of substituted equipment.

1.10 VISIT SITE

A. This contractor shall visit the site of the building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions and operations. Failure on his part to do this will not be cause for extras after the contract is signed because of unforeseen conditions. Any existing electrical wiring and conduit, gas, water drainage piping encountered within the building area shall be relocated or removed where required by this contractor at no extra cost to the Owner.

1.11 COORDINATION OF WORK

A. It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for the installation of systems according to the true intent and meaning of the Contract Documents. Anything not clear or in conflict will be explained by making an application to Architect. Should conditions arise where certain changes would be advisable, secure Architect's approval of these changes before proceeding with the work.

B. Coordinate work of various trades in installing inter-related work. Before installation of mechanical items, make proper provisions to avoid interferences in a manner approved by Architect. Changes required in work specified in Division 23 caused by neglect to do so shall be made at no cost to the Owner.

C. Provide inserts and supports required by Division 23 unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other divisions of the Work to Sections involved insufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from an improper location of installation of items above shall be borne by Division 23.

D. Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterward to satisfaction of Architect. Cut carefully to minimize the necessity for repairs to existing work. Do not cut beams, columns, or trusses.
   1. Each Section of this Division shall bear the expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, and tardiness or because of damage done by it.
   2. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is the responsibility of Section installing work.

E. Adjust locations of pipes, etc. to accommodate work from interferences anticipated and encountered. Determine the exact route and location of each pipe and duct before fabrication.
   1. Make offsets, transitions, and changes in direction of pipes, as required to maintain proper headroom and pitch of sloping lines whether or not indicated on Drawings.

F. Slots and openings through floors, walls, ceilings, and roofs shall be provided by other Divisions in their respective materials. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.12 EXCAVATION AND TRENCHING FOR PIPING

A. Excavate to the depths indicated on the Drawings or as otherwise specified. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulated therein shall be removed by pumping or by other approved methods. Do sheeting and shoring as may be necessary for the protection of the work and safety of personnel. Excavation shall be by open-cut except for that short sections of the trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.

B. Trench Excavation: The bottom of the trench for tile or concrete pipe shall be rounded so that at least the bottom quadrant of the pipe rests firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. Grate bottom of trenches to provide uniform bearing and support for each section of pipe, on undisturbed soil. Where rock is encountered, excavate to a minimum over-depth of 4" below trench depths indicated on the drawings or specified. Over-depths in rock excavation and unauthorized over-depths shall be backfilled. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered, such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.

C. Depth of Cover: Trenches shall be of a depth that will provide a minimum depth of cover of three feet for water, sanitary and storm sewer, and two feet for gas piping from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.

1.13 BACKFILLING OF TRENCHES

A. Trenches shall not be backfilled until required pressure and other tests have been performed, an inspection of utility, and Code officials have been accomplished, and until the utility systems as installed conform to requirements of drawings and specifications.

B. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones over 2-1/2 inch maximum dimension, deposited in 6-inch layers and compacted to 95% of the maximum laboratory density determined per ASTM D-698, Moisture-Density Relation of Soils. Tests for maximum density will be made with expense borne by the contractor. If fills fail to meet the specified densities, the contractor shall remove and re-compact the fill until specified densities are achieved.

C. Tests for Displacement of Sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the contractor at his expense.

1.14 GENERAL PIPING INSTALLATION

A. Furnish and install a complete system of piping. The piping drawings are diagrammatic and indicate the general location and connections. If the size of any piping is not evident, obtain instructions from the Architect before proceeding with the work. The piping may have to be offset, lowered or raised as required or as directed at the site. This does not relieve the contractor from responsibility for the proper erection of systems of piping in every respect suitable for the work intended. Piping systems that are not to be installed completely shall be so noted.

B. Erection: Piping shall be cut accurately for fabrication to measurements established at the construction site. Pipe shall be worked into place without springing and/or forcing. Remove all burrs and cutting slag by reaming or other cleaning methods. Changes in direction shall be made with fittings, except that bending of pipe will be permitted, providing a hydraulic pipe bender is used. Bent pipe showing kinks, wrinkles, or other malformation will not be acceptable. Piping shall be arranged so as not to interfere with the removal of other equipment or devices, nor to block access manholes or other access openings. Piping shall be installed to ensure noiseless circulation.

C. A minimum slope of piping shall be per the following unless otherwise specifically shown on the drawings or specified:

Type of Piping Fluid Conveyed	System Component	Length for 1" Fall	Direction of Fall
Condensate	Return main	20 feet	Condensate flow
Freon	Main	20 feet	Direction of flow

D. Protection: Open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the system. Plugs or rags, wood, cotton, concrete, waste, or similar materials must not be used in plugging.

E. Installation of Underground Pipe: The bottom of the trench shall be shaped to give substantially uniform circumferential support to the lower third of each pipe. Pipe shall be laid true to line and grade in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets to flow line. As work progresses, the interior of the pipe shall be cleared of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe size, a suitable swag or drain shall be kept in the pipe and pulled forward past each joint immediately after jointing has been completed. Trenches shall be kept free from water until pipe jointing has set and pipe shall not be laid when the condition of trench or weather is unsuitable for such work.

F. Cleaning and Flushing: The contractor shall take every precaution to remove dirt, grease, and all other foreign matter from each length of piping before making connections in the field. After each section of piping is installed, it shall be flushed with clean water except where specified otherwise.

G. Pipe Sizes: If the size of any piping is not evident in the drawings, the contractor shall request instructions from the Architect as to the proper sizing. Any changes resulting from the contractor's failure to request clarification shall be at his expense.

1.15 THERMAL AND MOISTURE PROTECTION

A. Install flashing, counterflashing, and caulk or seal all penetrations in exterior walls or floors as required to prevent exterior moisture from entering the building.

1.16 EQUIPMENT AND MATERIALS

A. Product Approvals:
   1. If approval is received to use other than specified items, responsibility for specified capacities, and ensuring that items to be furnished will fit space available lies with this Division.
   2. In the event other than specified equipment is used and will not fit job site conditions, this Division assumes responsibility for replacement with items named in the specification.

B. Use domestic-made pipe, pipe fittings, and motors on the project.

C. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connection and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.

D. Follow the Manufacturer's directions in delivery, storage, protection, and installation of equipment and materials.
   1. Promptly notify Architect in writing of conflicts between requirements of Contract Documents

and manufacturer's directions and obtain Architect's written instructions before proceeding with work. Bear expenses arising from correcting deficiencies of work that do not comply with Manufacturer's directions or such written instructions from Architect.

E. Deliver equipment and material to the site and tightly cover to protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls), in a dry, heated space.

1.17 REVIEW OF MATERIALS AND EQUIPMENT

A. Furnish complete catalog data for manufactured items of equipment to be used in Work to Architect for review within 30 days after award of Contract.

B. Submit all mechanical items in (1) complete submittal. Provide an index of all items submitted, including specification section number, in the order, they appear in the specifications.
   1. State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. Pertinent information shall include as a minimum those items as scheduled on the drawings. Arrange submittal information to reflect these categories scheduled on the drawings.
   2. Provide an index of tab numbers at the front of each binder. List the specification number and category included under each tab as described in the specifications and as scheduled on the drawings.
   3. Provide a cover sheet for each tab section. List each piece of equipment by name, model number, and supplier.
   4. Underline applicable data and indicate the model being supplied on each submittal sheet.

C. If data is not submitted as specified or submittal is not complete, it will be returned without review.

D. Catalog data or shop drawings for equipment which are noted as being reviewed by the Architect, shall not supersede Contract Documents.

E. Review comments of Architect shall not relieve this Division from responsibility for deviations from Contract Documents unless Architect's attention has been called to such deviations in writing at the time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

F. Check work described in catalog data with Contract Documents for deviations and errors.

1.18 GUARANTEE

A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or in the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.

B. The Contractor shall, after completion of the original test of the installation, and acceptance of the Architect, provide any service incidental to the proper performance of the mechanical systems under guarantees outlined above for one (1) year.

1.19 FINALLY

A. It is the intention that this specification shall provide a complete installation except as hereinbefore specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included.

B. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

PART 2 PRODUCTS

Not Applicable.

PART 3 EXECUTION

Not Applicable.

END OF SECTION

SECTION 23 0501
MECHANICAL DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of general demolition work is shown on drawings. Coordinate the required mechanical and plumbing work with the general demolition.

B. Demolition includes removal of systems and removal and disposal of demolished materials, as shown on drawings and herein specified.

C. The Owner shall have the option of retaining any items removed. The Contractor shall deliver these items to the Owner's designated storage area. Any items not retained by the Owner shall be disposed of off-site by the Contractor.

1.03 JOB CONDITIONS

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.
   1. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The contractor shall visit the site and determine the actual conditions prior to bidding.

B. Partial Removal: Items of salvable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.
   1. Storage or sale or removed items on site will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

D. Protections; Ensure safe passage of persons around or through area of demolition.

   Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
   1. Install temporary mechanical services, plumbing, temperature control, etc., as required by the Owner or authorities having jurisdiction.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

F. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with Owner at least 24 hours in advance.
   1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary

services during interruptions to existing utilities, as acceptable to governing authorities.

2. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

G. If Contractor is required to disconnect utility services or other services to an occupied area, the Contractor shall provide temporary or alternative service to that area, as required by Owner.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove all equipment, piping, etc., as indicated on the drawings.

B. All items shown to remain active shall be furnished with necessary devices or accessories.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.

1. Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:

1. Transport materials removed from demolished structures and dispose of offsite.

END OF SECTION

SECTION 23 0529
HANGERS & SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and equipment hangers and supports.

B. Equipment bases and supports.

C. Sleeves and seals.

D. Flashing and sealing equipment and pipe stacks.

1.02 RELATED SECTIONS

A. Section 23 0719 - Piping Insulation.

1.03 REFERENCES

A. ASME B31.2 - Fuel Gas Piping

B. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

1.04 SUBMITTALS

A. Submit under provisions of Section 23 0500.

B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Plumbing Piping - Water:
   1. Conform to ASME B31.9 and ASTM F708.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   6. Wall Support for Pipe: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.
   8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

B. Hydronic Piping:
   1. Conform to ASME B31.9 and ASTM F708.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   6. Vertical Support: Steel riser clamp.
   7. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.02 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.03 FLASHING

A. Metal Flashing: 28-gauge 304 stainless steel.

B. Copper Flashing: 16 oz. / sq. ft.

C. Lead Flashing:
   1. Waterproofing: 6 lb. / sq. ft.

D. Caps: Steel, 22-gauge minimum; 16-gauge at fire-resistant elements.

2.04 SLEEVES

A. Sleeves for Pipes thru Non-fire Rated Floors: 18-gauge galvanized steel.

B. Sleeves for Pipes thru Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe.

C Sleeves for Ductwork and Pipes thru Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire-rated sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Galvanized steel.

E. Sleeves for Rectangular Ductwork: Galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install per manufacturer's instructions.

B. Coordinate wall and floor penetration sealant requirements with a general contractor.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as scheduled.

B. Install hangers to provide minimum 1/2 inch space between the finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping on every floor. Support vertical cast iron pipe at each floor at the hub.

G. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl space, Pipe-shafts and suspended ceiling spaces are not considered exposed.

3.03 EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, where indicated on Drawings, minimum 4 inches thick, and extending 6 inches beyond supported equipment. Refer to Section 03 3000. Coordinate the exact size required for pads.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.04 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 4 inches minimum above-finished roof surface with lead worked one-inch minimum into a hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and calk, metal counter-flash, and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36-inch sheet size. Fasten flashing to drain clamp device.

D. The sealed floor drains watertight to adjacent materials.

E. Adjust storm collars tight to pipe with bolts; calk around the top edge. Use storm collars above roof jacks. Screw vertical flange section to the face of the curb.

3.05 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

C. Extend sleeves through floors one inch above the finished floor level. Caulk sleeves.

D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and calk. Provide close-fitting metal collar or escutcheon covers at both sides of penetration. Secure collar or escutcheon to prevent blow-out. Fire stopping materials shall meet the requirements of ASTM E119.

E. Install chrome-plated steel escutcheons at finished surfaces.

3.06 SCHEDULES

PIPE SIZE	MAX. HANGER SPACING	HANGER ROD DIAMETER
Inches	Feet	Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8

END OF SECTION

SECTION 23 0548
VIBRATION AND SEISMIC CONTROLS FOR HVAC SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. The requirements for seismic protection measures to be applied to HVAC equipment specified herein are in addition to any other items called for in other sections of these specifications. The seismic protection shall conform to Design Category D of the 2021 Arkansas Fire Prevention Code. The HVAC equipment shall include the following items to the extent required on plans or in other sections of the following specifications:
   1. Air Handling Units
   2. Ductwork over 6sq. ft. in Area
   3. Components Weighing More than 75 Pounds

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Requirements - Section.

1.03 APPLICABLE PUBLICATIONS

A. American Society of Civil Engineers: ASCE 7

B. Federal Specifications:
   1. RR-W-410D

1.04 REGULATORY REQUIREMENTS

A. Conform to 2021 Fire Prevention Code.

PART 2 PRODUCTS

2.01 Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and shown.

2.02 Sway brace of structural steel conforming with ASTM A36.

2.03 Mechanical couplings of the sleeve type to provide a tight flexible joint under all reasonable conditions.

2.04 Square-head bolts and heavy hexagon nuts, ANSI B18.2.1 and B12.2.2 and ASTM A307or 306.

2.05 Guy wires where required shall conform to Fed Spec. RR-W-441 as follows:

5/32" diameter	Type V, Class 1
3/16" to 5/16" diameter	Type V, Class 2
1/4" to 5/8" diameter	Type I, Class 2

PART 3 EXECUTION

3.01 All rigidly mounted equipment will have a minimum of four (4) anchor bolts securely fastened through bases or backs. Anchor bolts must conform to ASTM A307. Anchor bolts shall have an embedded straight length equal to at least twelve times the nominal diameter of the bolt and shall conform to the applicable tables for various equipment weights.

Maximum Equipment Weight (Pounds)	
500	1/2
1,000	1/2
5,000	1/2
10,000	1/2
20,000	1/2
30,000	5/8
50,000	3/4
100,000	1

Based on four (4) bolts per item; a minimum embedment of 12 bolt diameters, a minimum bolt spacing of 16 bolt diameters and a minimum edge distance of 12 bolt diameters. Use equivalent total cross-sectional area when more than four bolts per item are provided. Anchor bolts that exceed normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths. When height-to-width ratio of the equipment exceeds 8.9, overturning must be investigated. Expansion anchors shall not be used to resist seismic or vibratory loads unless test data are provided to verify the adequacy of the specific anchor and application. In no case shall the expansion anchor size be less than that required for bolts in the preceding table. Selection of anchor bolts for vibration isolation devices and/or snubbers to equipment base and foundations shall follow the same procedure, except that an equipment weight equal to five times the actual equipment weight shall be used

3.02 Equipment Sway Bracing shall be provided for all items supported from overhead floor or roof structures. Braces shall consist of angles, rods, bars, or pipes run at a 45° angle from the equipment frame to the building structure secured at both ends with no less than 1/2 inch bolts. Braces shall conform to all applicable codes and standards for Seismic Classification. Bracing shall be provided in two planes of directions, 90° apart, for each item of equipment. Details of all equipment bracing shall be submitted for approval. In lieu of bracing with vertical supports, these items may be supported with hangers inclined at 45°, provided that supporting members are properly sized to supporting operating weight of equipment when inclined at a 45° angle.

3.03 Sway bracing shall be provided for all 2-1/2 inch or larger pipes, not individually supported with hangers 12 inches or less in length.

3.04 Sway bracing shall be provided for ductwork over six (6) square feet in cross sectional area supported more than 12" from structure.

3.05 All terminals that weight more than 75 pounds shall have a safety chain or safety cable in addition to its other support.

3.06 Vibration isolators shall have a bumper restraint in each horizontal direction, and vertical restraints shall be provided where required to resist overturning.

3.07 Oversized plate washers extending to the equipment wall shall be used at bolted connections through the base sheet metal if the base is not reinforced with stiffeners or not capable of transferring the required loads.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division 23 sections.

B. Type of identification devices specified in this section, include the following:
Plastic Pipe Markers
Valve Tags
Valve Schedule Frames
Engraved Plastic-Laminate Signs
Ceiling Tacks
Thermostat Identification

C. Mechanical identification furnished as part of factory-fabricated equipment is specified as part of the equipment assembly in other Division 23 sections.

1.02 RELATED SECTIONS

A. Division 23 – All Sections.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. ANSI Standards: Comply with ANSI A13.1 for lettering size, colors, and viewing angles of identification devices.

1.04 SUBMITTALS

A. Product Data: Submit product specifications and installation instructions for each identification material and device desired.

B. Samples: Submit samples of each color, lettering style, and other graphic representation required for each identification material or system.

C. Schedules: Submit valve schedule for each piping system, typewritten, and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number; piping system, system abbreviation (as shown on tag), location of the valve (room or space), and variations for identification, if any. Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in a margin of schedule. In addition to mounted copies, furnish extra copies for Maintenance Manuals as specified in Division 1.

PART 2 PRODUCTS

2.01 MECHANICAL IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-21 sections. Where more than a single type is specified for the application, the selection is the Installer's option but provides a single selection for each product category.

B. Plastic Pipe Markers:
1. General: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent,

color-coded, plastic-sheet pipe markers, complying with ANSI A13.1.

a. Small Pipes: For external diameters less than 6 inches (including insulation if any), provide full-band pipe markers, extending 360° around the pipe at each location, fastened by one of the following methods:
   (1) Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
   (2) Adhesive lap joint in pipe marker overlap.
   (3) Laminated or bonded application of pipe marker to pipe (or insulation).

b. Large Pipes: For external diameters of 6 inches and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:
   (1) Laminated or bonded application of pipe marker to pipe (or insulation)
   (2) Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless-steel bands.

c. Lettering: Manufacturer's standard pre-printed nomenclature which best describes the piping system in each instance, as selected by Architect/Engineer in cases of variance with names as shown or specified.

d. Arrows: Print each pipe marker with arrows indicating the direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as a separate unit of plastic.

e. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum of 6 inches wide X 4 mil thick, manufactured for direct burial service.

C. Valve Tags:
   1. At the Contractor's option, provide one of the following:
      a. Brass Valve Tags: provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in 1/4 inch high letters and sequenced valve numbers 1/2 inch high and with 5/32 inch hole for a fastener. Provide 1-1/2 inch diameter tags, except as otherwise indicated.
      b. Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32 inch thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4 inch high letters and sequenced valve numbers 1/2 inch high, and with 5/32 inch hole for a fastener. Provide 1-1/2 inch square black tags with white lettering, except as otherwise indicated.
   2. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or beaded-type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

D. Valve Schedule Frames:
   1. General: For each page of the valve schedule, provide a glazed display frame, with screws for removable mounting on walls. Provide frames of rigid plastic or metal, with plastic glazing.

E. Engraved Plastic-Laminate Signs:
   1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of the substrate.
   2. Thickness: 1/16 inch for units up to 20 square inches or 8-inch length; 1/8 inch for larger units.
   3. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

F. Provide identification in or on all thermostats, CO2 Sensors, Humidistats, etc., indicating which unit number it serves.

G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering plastic pipe markers which may be incorporated in the work include, but are not limited to, the following: Seton Name Plate Company

EMED Co., Inc.
Approved equal

2.02 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations, and other designations used in mechanical identification work, with corresponding designations shown, specified, or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by the manufacturer or as required for proper identification and operation/ maintenance of mechanical systems and equipment.

B. Multiple Systems: Where multiple systems of the same generic name are shown and specified, provide identification which indicates individual system number as well as service.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:
   1. Coordination: Where identification is to be applied to surfaces that require insulation, painting, or other coverings or finishes, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification before installation of acoustical ceilings and similar removable concealment.

B. Ductwork Identification:
   1. General: Identify air supply, return, exhaust intake and relief ductwork with plastic signs and arrows, showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork color).
   2. Location: In each space where ductwork is exposed, or concealed only by a removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50' spacing along with exposed areas.
   3. Access Doors: Provide plastic-laminate type signs on each access door in ductwork and housings, indicating the purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate safety and procedural information.
   4. Concealed Doors: Where access doors are concealed above acoustical ceilings or similar concealment, plasticized tags may be installed for identification instead of specified signs, at Installer's option.

C. Piping System Identification:
   1. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces, (shafts, tunnels, plenums), exterior non-concealed locations and above removable acoustical ceilings.
      a. Near each valve and control device.
      b. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at the branch, where there could be a question of flow pattern.
      c. Near locations where pipes pass through walls or floors/ceilings or enter non-accessible enclosures.
      d. At access doors, manholes and similar access points which permit a view of concealed piping.
      e. Near major equipment items and other points of origin and termination.
      f. Spaced intermittently at a maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
      g. On piping above removable acoustical ceilings.

D. Valve Identification:
   1. General: Provide valve tag on every valve, cock, and control device in each piping system;

exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in the valve schedule for each piping system.

2. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.
   a. Where more than one major machine room is shown for the project, install mounted valve schedule in each major machine room, and repeat only main valves which are to be operated in conjunction with operations of more than signet machine room.

E. Mechanical Equipment Identification:
   1. General: Install engraved plastic laminate sin on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
      a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
      b. Pumps and similar motor-driven units.
      c. Fans, blowers, primary balancing dampers, and mixing boxes.
      d. Central-station units.
      e. Tanks and pressure vessels.
      f. Motor starters and other control equipment.

F. Refer to Division-23 sections for identification requirements at the central-station mechanical control center; not work of this section.

G. Refer to Division-26 sections for identification requirements of electrical work; not work of this section.

H. Lettering Size: Minimum 3/8 inch high lettering for name of unity where the viewing distance is less than 2'-0"; 3/4 inch high for distances up to 6'-0"; and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 the size of principal lettering.

I. Text of Signs: In addition to the name of the identified unit, provide lettering to distinguish between multiple units, and warn of hazards and improper operations.

J. Operational valves and similar minor equipment items located in non-occupied spaces (including machine rooms) may, at the installer's option, be identified by the installation of plasticized tags instead of engraved plastic signs.

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for Testing, Balancing and Adjusting Heating, Ventilating, and Air Conditioning Systems.

1.02 RELATED SECTIONS

A. Section 23 0500 – Common Work Results for Heating, Ventilating, and Air Conditioning.

B. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 3100 – HVAC Ducts and Casings.

D. Section 23 0923 – DDC System for HVAC.

1.03 REFERENCES

A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.

B. ASHRAE - 2007 Systems Handbook: Chapter 37, Testing, Adjusting, and Balancing.

C. NEBB - Procedural Standards for Testing, Balancing, and Adjusting of Environmental Systems.

1.04 SUBMITTALS

A. Submit the name of adjusting and balancing agency for approval within 30 days after the award of Contract.

B. Submit test reports as a submittal under provisions of Section 01300 and Section 23 0500.

C. Before commencing work, submit draft reports indicating adjusting, balancing, and equipment data required.

D. Submit draft copies of the report for review before final acceptance of the Project. Provide final copies for Architect/Engineers and inclusion in operating and maintenance manuals.

E. Provide reports in hardback, letter size manuals, complete with an index page, and indexing tabs, with cover identification at front and side.

F. Include detailed procedures, agenda, and sample report forms before commencing system balance.

1.05 QUALITY ASSURANCE

A. The mechanical contractor may at his option perform a hydrostatic pressure test and hydronic balancing of the HVAC piping systems.

B. Air Balance Subcontractor shall be a qualified representative of the Air Distribution Manufacturer whose devices are used on the project or a qualified Independent Balancing Contractor. Air Balance Subcontractor may not be the Mechanical Contractor or the Sheet Metal Contractor on the project.

C. To be considered qualified, the Air Distribution Manufacturer shall include with air device shop drawings evidence of qualifications as follows:
   1. Resume of Air Balance Technician(s) to be used on the project including a list of major air balance projects within the last five (5) years. The minimum acceptable experience shall be three (3) years as Air Balance Technician and five (5) projects similar in size and complexity.

2. Resume of the firm's experience in air balance and list of air balance projects within the last five (5) years.
3. Evidence of certification of calibration of equipment.

D. To be considered to be qualified, Independent Air Balance Contractor shall submit evidence of qualifications as follows:
1. Resume of a firm's experience in air balance representing a minimum of two (2) years as an Air Balance Contractor. Resume shall include a list of air balance projects within the last five (5) years.
2. Resume of Air Balance Technicians(s) to be used on the project, including a list of major air balance projects within the last five (5) years. The minimum acceptable experience shall be three (3) years as Air Balance Technician and five (5) projects similar in size and complexity.
3. Evidence of certification of calibration or equipment.

1.06 SEQUENCING AND SCHEDULING

A. Sequence work under the provisions of Division 01.

B. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

C. Schedule and assist in final adjustment and test of life safety, smoke evacuation, and/or smoke control system with Fire Authority.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. All measurements during air balance operations shall be made utilizing the "Velometer" or "Anemometer" method. Instruments used for check of air quantities shall have recent certification of calibration.

B. The Air Balance Subcontractor shall furnish balance forms for all air systems. Forms shall list air distribution devices by location, system, size, pattern, CFM flow factor, and required velocity.

PART 3 EXECUTION

3.01 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:
1. Equipment is operable and in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Correct fan rotation.
7. Fire and volume dampers are in place and open.
8. Coil fins have been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage has been minimized.
12. Hydronic systems have been flushed, filled, and vented.
13. Correct pump rotation.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Report any defects or deficiencies noted during the performance of services to Architect/Engineer.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, the system cannot be properly balanced, report as soon as observed.

3.02 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineers to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.03 INSTALLATION TOLERANCES

A. Adjust air handling systems to plus or minus 5 percent for supply systems plus or minus 10 percent for return and exhaust systems from figures indicated.

B. Adjust hydronic systems to plus or minus 10 percent of design conditions indicated.

3.04 ADJUSTING

A. Recorded data shall represent measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in the report. Recheck points or areas as selected and witnessed by the Owner.

3.05 HYDROSTATIC TEST

A. After completion of the installation, all piping shall be tested under 100 psi hydrostatic pressure, which shall be maintained for one hour without loss of pressure; after the system is proven tight and put in service, the contractor shall perform the equipment start-up and operating tests. All equipment shall be placed in complete operating conditions subject to the approval of the Architect.

3.06 AIR BALANCE PROCEDURE

A. All air quantities shall, after completion of the job; be adjusted to provide air quantities shown on plans. After complete adjustment, additional re-adjustment shall be performed if necessary to satisfy the desired temperature.

B. The balance procedure shall include the checking of each supply, return, and exhaust fan. As a minimum, CFM, RPM, and ampere readings shall be taken. Pulley adjustments, etc., shall be performed to obtain the required CFM readings.

C. Air Balance Subcontractor shall also furnish all balancing instruments required. Air Balance Subcontractor shall provide one experienced technician to the team with the Contractor's technician to balance the system. The Air Balance Subcontractor's Technician and the Contractor's Technician shall perform as a team during the entire field balancing operation.

D. After all adjustments and corrections have been performed to balance the system as designed and required, the Air Balance Subcontractor shall prepare and submit three (3) copies of completed balance form to Architect/Engineer for approval.

E. At the time of balancing, the Air Balance Contractor's Technician shall verify that each device is the size and pattern submitted and includes accessories such as volume controls and deflectrols, where specified.

F. Where the project includes controlled Air Terminal Units, the Terminal Unit Manufacturer's Supplier shall be responsible for testing the automatic control devices on the Terminal.

3.07 WATER BALANCE PROCEDURE

A. With all manual valves in the fully open position and all control valves full flow to coil, adjust pump discharge valves to design flow on pumping systems.

B. Automatic flow control valves will balance flow to coils.

C. Balance flow through pumps at chillers, towers, and boilers.

3.08 SYSTEM OPERATING TEST

A. After the successful completion of all equipment start-up and individual item test requirements, formal tests shall be performed on the complete Mechanical systems, measurements shall be made and reports prepared as specified below. Provide all instruments, materials, and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms. Submit for the Architect's approval the form on which the measurements specified herein. Furnish all required record forms. Submit for the Architect's approval, complete shop drawings or catalog data for all instruments to be used for the 3-day operating test, and obtain approval at least two weeks before the forms and instruments will be required. Sample forms can be provided by the Architect if the Contractor requests.

B. First operating test by Contractor: Prove the operation of the Mechanical systems and each item in the systems. At least 10 days' notice shall be given the Architect of such tests. Should any item of the systems fail to perform in an approved manner, this test shall be repeated until the operating test is approved by the Architect. During this test, balance circulation of steam, condensate, heating and chilled water, air, and all other fluids conveyed to provide proper quantities to all items of equipment. Adjust and set all balancing cocks, valves, dampers, and similar items to ensure that the systems perform as intended.

C. Checking by Owner and Architect: Following the successful completion of first operating tests by the Contractor, the Owner and Architect shall have the privilege of making such tests as they may desire for three weeks to ascertain if any corrections are to be made to the system. At the end of the testing by the Owner and Architect, the Architect shall direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.

D. Contractor's corrections to systems: Make all required connections to the systems and notify the Architect in writing that the corrections outlined have been completed and give at least seven days' notice of a final 3-day operating test.

E. Three-day operating test: An operating test shall then be performed by the Contractor to the satisfaction of the Architect for three days. Should any element of the systems not perform properly, the Contractor shall make all required corrections, and the test shall be repeated until successfully performed.

F. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the 3-day operating test.
   1. Electrical: Running ampere and voltage of each motor 3/4HP or larger.
   2. Air pressures at the entrance and exit of each electronic air cleaner, filter, coil, fan, and damper.
   3. Air temperatures in each heated or air-conditioned space, at the entrance and exit of each coil, downstream from each pair of dampers where the air of two different temperatures is

mixed and outside the structure.

4. Relative humidity at the location of each humidity sensor.
5. Water pressures at each pump suction and discharge and entrance and exit of each convertor, and each heating and cooling coil.
6. Water temperature at the entrance and exit of each convertor and each heating and cooling coil.
7. Domestic hot water supply temperature at the fixtures closest to and farthest away from the domestic water heater on each system (only once during a 3-day test.
8. Running ampere and voltage on recirculating pumps.
9. The static pressure of cold-water line at building service connection (only once during a 3-day test).

G. Report: Four copies of a written report of the 3-day operating test, on the approved form of record, shall be submitted to the Architect for approval and subsequent transmittal to the Owner.

END OF SECTION

SECTION 23 0713
DUCT INSULATION FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for Duct Insulation for HVAC Systems.

1.02 RELATED SECTIONS

A. Section 23 3100 – HVAC Ducts and Casings.

1.03 REFERENCES

A. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.

B. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

C. ASTM E96 - Water Vapor Transmission of Materials.

D. NFPA 255 - Surface Burning Characteristics of Building Materials.

E. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

F. Test standards and procedures for evaluating and a rating performance of fire-resistive and zero inch clearance, duct wrap systems.
   1. Underwriters Laboratories Inc., (UL):
      a. UL 723, Surface Burning Characteristics per ASTM E 84.
      b. UL 1978, First Edition of the Standard for Grease Ducts.
      c. UL 1479, Through-Penetration Firestop Test.
   2. American Society for Testing and Materials (ASTM):
      a. E119, Standard Method of Fire Test of Building Construction and Materials; 2-hour External Total Engulfment Test.
      b. E814, Standard Method of Fire Tests of Through-Penetration Fire Stops.
   3. NFPA 96, 1994 Edition, Ventilation Control and Fire Protection of Commercial Cooking Operations.

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 23 0500.

B. Product Data: Provide product description, list of materials, and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/100 per NFPA 255.

1.06 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with a minimum of three years- experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 23 0500.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's density, and thickness.

C. Store insulation in the original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cement.

PART 2 PRODUCTS

2.01 GLASS FIBER, FLEXIBLE

A. Insulation: ASTM C553 and C612; flexible, non-combustible blanket.
   1. "K" value: 0.27 at 75 °F.
   2. Maximum service temperature: 250 °F.
   3. Maximum moisture absorption: 0.20 percent by volume.
   4. Density: 1.0 lb./cu ft.

B. Vapor Barrier Jacket:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture vapor transmission: 0.04 perm.
   3. Secure with adhesive and tape.

C. Vapor Barrier Tape
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with a pressure-sensitive rubber-based adhesive.

2.02 GLASS FIBER, RIGID

A. Insulation: ASTM C612; rigid, non-combustible blanket.
   1. "K" value: 0.24 at 75 °F.
   2. Maximum service temperature: 350 °F.
   3. Maximum moisture absorption: 0.20 percent by volume.
   4. Density: 4.2 lb./cu ft.

B. Vapor Barrier Jacket:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture vapor transmission: 0.04 perm.
   3. Secure with adhesive tape.

C. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with a pressure-sensitive rubber-based adhesive.

2.03 GLASS FIBER DUCT LINER, FLEXIBLE

A. Insulation: ASTM C553; flexible, bonded fibers, non-combustible blanket with edge coating.
   1. "K" value: 0.26 at 75 °F.
   2. Maximum service temperature: 250 °F.
   3. Density: 1.5 lb./cu ft.

B. Adhesive:
   1. Waterproof, fire-retardant type.

C. Liner Fasteners: Galvanized steel, the impact applied, or welded with a press on head conforming to Mechanical Fastener Standard MF-19/1.

2.04 FIRE-RATED DUCT INSULATION

A. A lightweight, non-asbestos, high-temperature inorganic foil encapsulated insulation blanket. Duct wrap system is used on commercial grease hood duct systems allowing a zero inch clearance to combustible construction and as a 2-hour fire-resistive rated enclosure system (shaft enclosure) when used with a listed or approved through-penetration system.

B. Performance Requirements:
   1. Two-hour rated fire-resistive enclosure assembly, ASTM E119; Total Engulfment Test.
   2. Class 1 interior finish materials, ASTM E84
   3. Zero inch clearance to combustibles, maximum allowable surface temperatures on the unexposed side, UL 1978.
   4. Three-hour, through-penetration protection systems for grease duct, ASTM E814, and UL 1479.

C. Materials
   1. FlameChek™ Duct Insulation.
   2. Tapes:
      a. High-Performance Filament Tape: one-inch wide.
      b. Aluminum Foil Tape: to seal cut edges of blankets.
   3. Banding Material:
      a. Minimum 1/2 inch wide, .015 inch thick, type 304-stainless steel.
   4. Insulation Pins: 12-gauge, minimum 4-1/2 inches long, Type 300 series stainless steel, with 1-1/2 inch square or round speed clips.
   5. Fire-stopping materials:
      a. Mesh: 304 stainless steel, .011 inch thick, 12 inches wide
      b. FlameChek™ Fiber Blanket
      c. Unifrax FryePutty
   6. Grease Duct Access Door, by duct fabricator:
      a. Door Enclosure:
         1) Steel angle opening frame.
         2) Access door cover, no less than 16-gauge.
         3) Insulation Pins.
         4) Speed Clips.
      b. Hardware:
         1) Threaded rods: Minimum 4-1/2 inches long, 1/4 inch diameter galvanized steel with wing nuts and metal washers.
         2) Steel tubing to fit over threaded rods, optional.
         3) Wingnuts.

2.05 APPROVED MANUFACTURERS

A. Glass Fiber, Flexible:
   1. Owens Corning Fiberglass, Type 100.
   2. Architect Approved.

B. Glass Fiber, Rigid:
   1. Owens Corning Fiberglass, Type 704.
   2. Architect Approved.

C. Glass Fiber Duct Liner, Adjustable:
   1. CertainTeed ToughGard 150.
   2. Architect Approved.

D. Grease Duct Insulation
   1. Flamechek Duct Insulation, CertainTeed Corporation.
   2. Architect approved

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ductwork has been tested and joints and seams sealed, before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install materials per the manufacturer's instructions.

B. Insulated ductwork conveying air below or above ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate the entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Grease Duct
   1. Apply two layers of FlameChek insulation with all seams and joints overlapped by 3 inches.
   2. Off-set the longitudinal joint on the second layer by 10.5" from the first layer.
   3. Secure the insulation to the duct using tape, SS bands, and insulation pins.
   4. Follow all manufactures installation requirements for the installation of the insulation, transitions, hangers, access doors, and thru-penetrations.

D. Ducts exposed outside the building shall be externally insulated with 2" thick rigid glass fiber insulation, and covered with a "peel and stick" membrane jacket system equal to "Alumguard" (50-60 mil thickness & .3 lbs./sf weight).

3.03 TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 FLEXIBLE GLASS FIBER DUCTWORK INSULATION SCHEDULE

DUCTWORK	THICKNESS
All supply, return and outside air ducts inside the building Unless noted otherwise.	2 inches
Dishwasher exhaust duct	2 inches

3.05 RIGID GLASS FIBER DUCTWORK INSULATION SCHEDULE

DUCTWORK	THICKNESS
All ductwork external to the building (See Section 3.02, Paragraph D)	2 inches

3.06 FLEXIBLE GLASS FIBER DUCT LINER INSULATION SCHEDULE

DUCTWORK	THICKNESS
Furnace Plenums & ductwork shown Cross-hatched on drawings.	1 inch

3.07 FIRE RATED DUCT INSULATION

	THICKNESS
Range hood exhaust ductwork (See Section 3.02, Paragraph C)	(2) 1½" layers

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for Piping Insulation for Heating, Ventilating, and Air Conditioning systems.

1.02 RELATED SECTIONS

A. Section 23 2300 – Refrigerant.

1.03 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C195 - Mineral Fiber Thermal Insulation Cement.

C. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

D. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

E. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

F. ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

G. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

H. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

I. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

J. ASTM E96 - Water Vapor Transmission of Materials.

1.04 SUBMITTALS

A. Submit under provisions of Division 01 and Section 23 0500.

B. Product Data: Provide product description, list of materials, and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/100 or less per ASTM E84, NFPA 255, and UL 723.

1.06 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with a minimum of three years of work experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 23 0500.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Store insulation in the original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cement.

PART 2 PRODUCTS

2.01 CELLULAR FOAM

A. Insulation: SASTM C534; flexible, cellular elastomeric, tubing.
   1. "K" Value: ASTM C177 C518; 0.27 at 75 °F.
   2. Minimum Service Temperature: -40 °F.
   3. Maximum Service Temperature: 220 °F.
   4. Maximum Moisture Absorption: ASTM D1056; 1.0 percent pipe by volume, .0 percent sheet by volume.
   5. Moisture Vapor Transmission: ASTM E96, 0.20 perm inches.
   6. Maximum Flame Spread: ASTM E84; 25.
   7. Maximum Smoke Developed: ASTM E84; 25
   8. Connection: Waterproof vapor barrier adhesive.

2.02 APPROVED MANUFACTURERS

A. Cellular Foam:
   1. Armstrong-Armaflex - FR.
   2. Architect Approved.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install materials per the manufacturer's instructions.

B. On exposed piping, locate insulation and cover seams in the least visible locations.

C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field applied.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as an adjacent pipe.
   3. Finish with glass cloth and vapor barrier adhesive.
   4. PVC fitting covers may be used.
   5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
   6. Insulate the entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. For insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without a vapor barrier, factory-applied, or field applied.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as an adjoining pipe.
   3. Finish with glass cloth and adhesive.
   4. PVC fitting covers may be used.
   5. For hot piping conveying fluids 140 °F or less, do not insulate flanges and unions at equipment, but bevel and seal end of the insulation.

6. For hot piping conveying fluids over 140 °F, insulate flanges and unions at equipment.

E. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finished jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

F. Finish insulation at supports, protrusions, and interruptions.

G. For exterior applications, provide a vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum or stainless-steel jacket with seams located on the bottom side of horizontal piping.

H. For buried piping, provide the factory-fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of a bituminous compound; outer surface faced with a polyester film.

I. For heat traced piping, insulate fittings, joints, and valves with insulation of like material, thickness, and finish as an adjoining pipe. Ensure the size is large enough to enclose pipe and heat tracer. Cover with an aluminum jacket with seams located on the bottom side of horizontal piping.

J. Valves and fittings insulated with block insulation shall be finished with insulating cement and troweled to a smooth and uniform finish.

3.03 TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 REFRIGERANT PIPING

A. Refrigerant suction lines shall be insulated with ¾ inch thickness Armstrong FR/Armaflex, or approved equal, and shall be installed to manufacturer's recommendations. Joint-butt, joints with 520 adhesives. The insulation shall not be slit for installation.

B. All suction lines exposed to weather shall have two (2) coats of Armstrong aluminum cold storage paint applied directly to the Armaflex insulation surface.

3.05 ARMAFLEX INSULATION SCHEDULE

A.	Refrigerant Suction	¾ inch
B.	Humidity Drain (Interior)	½ inch

END OF SECTION

SECTION 23 0923
DIGITAL CONTROLS

PART 1 GENERAL

1.01 BUILDING AUTOMATION SYSTEM - GENERAL DESCRIPTION

A Provide a new Building Automation System (BAS) to integrate and control all mechanical equipment associated with this project.

1. The Building Automation System shall be as indicated on the drawings and described in these specifications. System must be fully integrated and coordinated with mechanical equipment DDC controllers furnished and installed in the equipment manufacturer's factory as specified in those sections. The intent of the BAS is to integrate all mechanical equipment into one system for global monitoring, control, and alarming associated with the building. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system to ensure occupant comfort while maintaining energy efficiency.
2. The BAS shall meet open standard protocol communication standards (As defined in System Communications Section) to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects.
3. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and terminal devices on this project.
4. Approved vendors, products and web services shall comply with SOC2 Type II as defined by the AICPA. SOC2 Type II compliance is a certification that confirms that a service provider has established and implemented effective controls to secure their clients' data in accordance with the Trust Services Criteria (TSC).
   a. SOC2 Type II compliance provides assurance to customers that the service provider has established and implemented effective security controls and is committed to protecting their data.
   b. To achieve SOC2 Type II compliance, the manufacturer shall have completed an independent audit to assess design and implementation of their controls, policies, and procedures.
5. The BAS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by the security permissions of the operator role. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.

1.02 APPROVED CONTROL SYSTEM MANUFACTURES

A. Approved BAS Manufacturers
   1. Trane Tracer®
   2. Architect Approved

1.03 QUALITY ASSURANCE

A. BAS Manufacturer Qualifications

1. The BAS manufacturer shall have an established business office within 50.00 miles of the project site and must provide 24 hours/day, 7 days/week response in the event of a customer warranty or service call.
2. The BAS Manufacturer shall have factory trained and certified personnel providing all engineering, service, startup, and commissioning field labor for the project from their local office location. BAS manufacturer shall be able to provide training certifications for all local office personnel upon request.
3. The BAS shall be provided by a single manufacturer and this manufacturer's equipment must consist of operator workstation software, Web-based hardware/software, Open Standard Protocol hardware/software, Custom application Programming Language, Graphical Programming Language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (i.e., sensors, valves, dampers, actuators, etc.) need not be manufactured by the BAS manufacturer listed in this specification.
4. Independent representatives of BAS manufacturers are not acceptable. BAS vendor must be corporate owned entity of BAS manufacturer.

1.04 CODES AND STANDARDS

A. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.

1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
2. National Electrical Code -- NFPA 70.
3. Federal Communications Commission -- Part J.
4. ASHRAE/ANSI 135-2012 (BACnet) - (System Level Devices) - Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.
5. ASHRAE/ANSI 135-2012 (BACnet) - (Unit Level Devices) - Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

1.05 SYSTEM PERFORMANCE

A. Performance Standards. The BAS system shall conform to the following:

1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.
2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.

4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.
5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
8. Multiple Alarm Annunciations. All workstations on the network shall receive alarms within 5 seconds of each other.

1.06 SUBMITTAL REQUIREMENTS

A. BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications.
   1. Provide electronic submittal package in PDF format for review and approval.

B. Quantities of items submitted shall be reviewed by the Engineer and Owner. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.

C. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.

D. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats once they have been approved and as-built drawings have been completed.

E. Submit the following within 90 days of contract award:
   1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.
   2. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
   3. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
   4. Provide all manufacturers' technical cut sheets for major system components. When technical cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Include:
      a. Building Controllers
      b. Custom Application Controllers
      c. Application Specific Controllers

d. Operator Workstations
e. Portable Operator Terminals
f. Auxiliary Control Devices

5. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements
6. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
7. Provide a sequence of operation for each controlled mechanical system and terminal end devices.
8. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.

F. Project Record Documents: Upon completion of installation, submit three (3) copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:

1. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic media including CAD .dwg and .pdf drawing files shall be provided.
2. Testing and Commissioning Reports and Checklists signed off by trained factory (equipment manufacturers) and field (BAS) commissioning personnel.
3. Operating and Maintenance (O & M) Manuals - These shall be as-built versions of the submittal product data. In addition to the information required for the submittals, Operating & Maintenance manual shall include:
   a. Procedures for operating the BAS including logging on/off, alarm management, generation of reports, trends, overrides of computer control, modification of setpoints, and other interactive system requirements.
   b. Explanation of how to design and install new points, new DDC controllers, and other BAS hardware.
   c. Documentation, installation, and maintenance information for all third-party hardware/software products provided including personal computers, printers, hubs, sensors, valves, etc.
   d. Original issue media for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
   e. Licenses, Guarantee, and Warranty documents for all equipment and systems.

G. Training Manuals: The BAS manufacturer shall provide a course outline and copies of training manuals at least two weeks prior to the start of any corporate training class to be attended by the Owner.

1.07 WARRANTY REQUIREMENTS

A. Warrant all work as follows:

1. BAS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BAS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BAS manufacturer shall respond to the Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours (8AM-5PM).
2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BAS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.
3. To ensure that the owner will have the most current operating system provided by the manufacturer, the BAS manufacturer shall include licensing and labor costs to facilitate software/firmware updates throughout the warranty period at no charge to the owner. These updates shall include upgrades for functional enhancements associated with the following: operator workstation software, project specific software, graphics, database, firmware updates, and all security related service packs. Written authorization by the Owner must be granted prior to the installation of these updates.
4. The BAS manufacturer shall provide a web-accessible Users Network for the proposed System and give the Owner free access to question/answer forum, user tips, upgrades, and training schedules for a one-year period of time correlating with the warranty period.

1.08 SYSTEM MAINTENANCE AND REMOTE ANALYSIS

A. The BAS Manufacture shall provide Building Automation System remote technical support and system analysis for a period of 1 year (beginning the date of substantial completion).

B. The BAS manufacturer shall setup a secure remote connection for data collection, analytics and remote technical support for the HVAC systems included in this contract.

1. Provide technician support during the warranty period to diagnose issues remotely through the secure remote connection.
2. The building owner is responsible for providing adequate internet access.

C. Connectivity / Remote Access / Network Security

1. Provide and maintain secure remote access to the facilities Building Automation System (BAS) or other building systems. Users accessing service through this connection shall not have access to the building owner's network. Secure remote access to the BAS shall not require ANY inbound ports on a firewall to be "exposed" or "forwarded".
2. Secure remote access to the BAS shall be available anywhere, anytime, using a compatible client device (PC/tablet/phone)
3. The Owner will provide up to Three (3) IP drops and IP addresses on the owners network to gain access to the internet. The BAS manufacture shall coordinate with the Owners IT team, verify the proposed system shall meet all network

security requirements and any other network configuration information necessary to each control contractor for the purpose of configuring each Area Controller on the network. It shall be the responsibility of the BAS manufacture to coordinate with the owner for network connectivity.

D. The BAS Manufacture shall provide a professional analysis for the facility HVAC systems.
   1. The analysis shall consist of an evaluation of HVAC systems including charts and graphs which indicate both current building performance and opportunities for building and HVAC system performance improvement.

E. The following shall be provided after substantial completion of the project:
   1. Orientation meeting with the building owner's representative to identify the HVAC systems that will be evaluated.
   2. System setup for data collection and analytics. BAS Manufacture to setup a secure remote data collection and analytics for identified systems.
   3. Assessment analysis shall be performed by trained personnel with relevant professional credentials in HVAC systems, energy management and building optimization methodologies.
   4. Consultation meeting with owner to review performance reports and improvement opportunities.

F. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of owner.

1.09 OWNERSHIP OF PROPRIETARY MATERIAL

A. Project specific software and documentation shall become the owner's property upon project completion. This includes the following:
   1. Operator Graphic files
   2. As-built hardware design drawings
   3. Operating & Maintenance Manuals
   4. BAS System software database

1.10 DEFINITIONS

A. DDC: Direct digital control

B. I/O: Input/output.

C. MS/TP: Manager Subordinate / Token Passing.

D. POT: Portable Operator's Terminal.

E. PID: Proportional plus integral plus derivative.

F. RTD: Resistance temperature detector.

G. BAS/ATC: Building Automation System/Automatic Temperature Controls.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the owner or the owner's representative. Spare parts shall be available for at least five years after completion of this contract.

2.02 SYSTEM COMMUNICATION

A. Building Automation System (BAS) Communication

1. Each workstation, building controller, and equipment controller communication interface shall utilize the BACnet™ protocol with an Ethernet (IEEE 802.3), Wi-Fi (IEEE 802.11), RS485 (EIA-485), or Zigbee® (802.15.4) physical interface and an appropriate data link technology as defined in ANSI®/ASHRAE® Standard 135-2012. (e.g. BACnet over IP, BACnet over IPv6, BACnet SC, BACnet over MS/TP, BACnet Zigbee).
2. All system controllers shall be BTL listed as a BACnet Building Controller (B-BC) as defined in ANSI®/ASHRAE® Standard 135-2012.
3. The system shall support both BACnet over IP and BACnet over MS/TP, allowing for a hybrid approach to meet various performance and cost requirements. Supporting both twisted-pair and Ethernet topologies to offer flexibility and cost-effectiveness.
4. All documented status and control points, schedule, alarm, and data-log services or objects shall be available as standard object types as defined in ANSI®/ASHRAE® Standard 135-2012.
5. Each System Controller shall communicate with a network of Custom Application and Application Specific Controllers utilizing one or more of the interfaces documented within Field Bus Communications below.
6. All system controllers shall be BTL listed as a BACnet Building Controller (B-BC) as defined in ANSI®/ASHRAE® Standard 135-2012.
7. All Operator Workstations (B-OWS, B-AWS) and Building Controllers (B-BC) shall support BACnet Secure Connect (BACnet SC), a secure and encrypted datalink layer specifically designed for those networks.

B. Field Bus Communications

1. BACnet™
   a. All equipment and plant controllers shall be BTL listed as a BACnet Application Specific Controller (B-ASC) or a BACnet Advanced Application Controller (B-AAC) as defined in ANSI®/ASHRAE® Standard 135-2012.
   b. All communication shall conform to ANSI®/ASHRAE® Standard 135-2012.
   c. System Controller shall function as a BACnet router to each unit controller providing a globally unique BACnet Device ID for all BACnet controllers within the system.
   d. BACnet Zigbee®

1) Communication between System Controller and equipment/plant controllers shall utilize BACnet Zigbee as defined in ANSI®/ASHRAE® Standard 135-2012.
2) Each equipment controller wireless communication interface shall self-heal to maintain operation in the event of network communication failure.
3) Each equipment controller wireless communication interface shall self-heal to maintain operation in the event of network communication failure.

e. BACnet MS/TP
1) Communication between System Controller and equipment/plant controllers shall utilize BACnet MS/TP as defined in ANSI®/ASHRAE® Standard 135-2012.

2.03 OPERATOR INTERFACE

A. Provide Building Operator Web Interface
1. Manufacturer shall provide a user interface with time-of-day schedules, data collection, dashboards, reports and building summary, system applications, and self-expiring timed overrides. Manufacturer shall provide a published user and applications guide(s) that detail the system application operation, configuration, setup and troubleshooting.
2. The building operator web interface shall be accessible via a web browser without requiring any "plug-ins" (i.e. JAVA Runtime Environment (JRE), Adobe Flash).
3. User Roles
a. The system shall include pre-defined "roles" that allow a system administrator to quickly assign permissions to a user.
b. User logon/logoff attempts shall be recorded.
c. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
4. On-Line Help and Training
a. Provide a context sensitive, online help system to assist the operator in operation and configuration of the system.
b. On-line help shall be available for all system functions and shall provide the relevant data for each particular screen.
5. Equipment and Application Pages
a. The building operator web interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:
1) Animated Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:
a) Animated Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:
b) Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog

outputs, such as valve or damper positions. Graphics shall be capable of launching other web pages.

2) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.

3) Historical Data (As defined in Trend Logs section of CONTROLLER SOFTWARE) for the equipment or application without requiring a user to navigate to a Data Log page and perform a filter.

b. System Graphics. Building operator web interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.

1) Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.

2) Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.

3) Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.

c. Graphics Library. Furnish a library of standard HVAC equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program.

d. Manual Control and Override

1) Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.

2) Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.

3) Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.

4) Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.

e. Scheduling. - The scheduling application shall provide graphical representation of the day, week, month and exception events.

f. Alarm/Event Notification

1) Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any building operator web interface.

a) The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
b) The operator shall be able to acknowledge and add comments to alarms
c) Alarm/event messages shall use full language, easily recognized descriptors.

2) Alarm Suppression. Alarms shall be able to be suppressed based on load/source relationships to present the likely root cause to the building operator as described in ASHRAE Guideline 36. Load/Source relationships shall be configurable by the user through a web interface.

g. Reports and Logs.

1) The building operator web interface shall provide a reporting package that allows the operator to select reports.
2) The building operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
3) The following standard reports shall be available without requiring a user to manually configure the report:
a) All Points in Alarm Report: Provide an on-demand report showing all current alarms.
b) All Points in Override Report: Provide an on-demand report showing all overrides in effect.
c) Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
d) Points report: Provide a report that lists the current value of all points
4) The controls vendor shall provide a hardening report that summarizes the port configuration details to ensure sites have not been exposed to the Internet in alignment with Cyber Security best practices.

B. Provide Mobile App Interface

1. Provide mobile (smart phone or tablet) interfaces to the building automation system, compatible with iOS and Android™ operating systems.
2. Controls manufacturer shall provide a phone/tablet interface with the ability to view/override status and setpoints, view/change schedules, view/acknowledge/comment on alarms, and view graphics for all spaces and equipment.
3. This phone/tablet interface shall resize itself appropriately for the size of the interface (i.e. no "pinching and zooming" required).
4. This phone/tablet interface shall function remotely from the facility while following IT security best practices (e.g. no ports exposed to the internet).
5. The operator interface shall support system access on a mobile device via a mobile app to:
a. Alarm log
b. System Status

c. Equipment status
d. Space Status
e. Standard Equipment graphics
f. Override set points
g. Override occupancy
h. Acknowledge Alarms
i. Add Comment(s) to Alarms

2.04 BUILDING CONTROLLER SOFTWARE

A. Manufacturer shall provide standard applications to deliver HVAC system control. Standard applications include Time of Day Scheduling with Optimal Start/Stop, VAV Air Systems Control, Chiller Plant Control, Historical Trend Logs and Trim and Respond. Manufacturer shall provide system optimization strategies for functions such as fan pressure optimization and ventilation optimization.

B. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the building operator interface.

1. Trend Logs

a. The system shall harvest trend logs for defined key measurements for each controlled HVAC device and HVAC application. Trend logs shall be captured for a minimum of 5 key operating points for each piece of HVAC equipment and HVAC application and stored for no less than 1 year at 15-minute intervals. Data Logs shall be capable of being configured on an interval or change of value basis.

1) Fan Coil / Cabinet Unit Heater / Unit Ventilator / WSHP Unit
   a) Discharge Air Temperature
   b) Space Temperature Active
   c) Space Temperature Setpoint Active
   d) Air Flow Setpoint Active
   e) Discharge Air Flow

2) Air Handling Unit/Rooftop (VAV)
   a) Discharge Air Temperature
   b) Discharge Air Temperature Setpoint Active
   c) Space Temperature Active
   d) Cooling Capacity Status
   e) Discharge Air Flow

3) Air Handling Unit/Rooftop (CV)
   a) Discharge Air Temperature
   b) Space Temperature Active
   c) Space Temperature Setpoint Active
   d) Cooling Capacity Status
   e) Heating Capacity Primary Status
   f) Outdoor Air Damper Position

4) VAV Terminal Unit
   a) Discharge Air Temperature
   b) Space Temperature Active

c) Space Temperature Setpoint Active
d) Air Flow Setpoint Active
e) Discharge Air Flow

5) Variable Air System (VAS)
a) VAS Operating Mode
b) Duct Static Optimization Duct Static Setpoint
c) Duct Pressure Optimization Maximum
d) Space Temperature Average
e) Ventilation Optimization Air Setpoint

2.05 BUILDING / SYSTEM CONTROLLERS

A. There shall be one or more independent, standalone microprocessor-based System Controllers to manage the global strategies described in CONTROLLER SOFTWARE section.
1. The controller shall provide a USB communications port for connection to a PC.
2. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
3. All System Controllers shall have a real time clock and shall be able to accept a BACnet time synchronization command for automatic time synchronization.
4. Data shall be shared between networked System Controllers.
5. Serviceability – The System Controller shall have a display on the main board that indicates the current operating mode of the controller.

B. Controls manufacturer shall provide secure remote access to the Building Automation System (BAS). Secure remote access shall not require IP ports to be "exposed" (i.e. port-forwarded or external public IP addresses) to the Internet. Controls manufacturer shall update secure remote access software as necessary to follow cyber security best practices and respond to cyber security events.

2.06 ADVANCED APPLICATION CONTROLLERS:

A. Advance Application Controllers shall be used to control all equipment or applications of medium and high complexity, including but not limited to Air Handlers, Boiler Plants and Chiller Plants.

B. The Advanced Application Controller shall be capable of operating as a stand-alone controller or as a member of a Building Automation System (BAS).

C. When the Advanced Application Controller is operating as a member of a Building Automation System (BAS), the application controller shall operate as follows:
1. Application Controller will receive operation mode commands from the BAS network controller. The BAS commands shall include but not be limited to the follow: Occupied Heat/Cool, Unoccupied Heat/Cool, Morning Warm-up, / Pre-cool, Occupied Bypass).
2. Application Controller will provide equipment status parameters to the BAS through BACnet communication.
3. Application Controller will operate as a stand-alone controller in the event of communication failure with the BAS.

4. In case of communications failure, stand-alone operation shall use default values or last known values for remote sensors read over the network such as outdoor air temperature.

D. For Stand-Alone Operation of Advanced Application Controllers:
   1. Shall operate a schedule in a standalone application using a Real Time Clock with a 7-day power backup.
      a. The Controller shall have a built-in schedule (assessable with or without a display)
      b. Support will be for at least 3 schedules with up to 10 events for each day of the week.
      c. Each of the 3 schedules can be Analog, Binary or Multi-State
      d. The controller shall support a minimum of 25 exceptions each with up to 10 events.

E. For ease of troubleshooting, the Controller shall support data trend logging.
   1. With a minimum of 20,000 trending points total on a controller
   2. Trends shall be capable of being collected at a minimum sample rate of once every second
   3. Shall be capable of trending all BACnet points used by controller
   4. Trends shall be capable of being scheduled or triggered.

F. To meet the sequence of operation for each application, the Controller shall use library programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.

G. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
   1. Operating conditions:
      a. Temperature: -40°F to 158°F (-40°C to 70°C)
      b. Relative Humidity: 5% to 100% RH (non-condensing)
   2. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
   3. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° F to 158° F [-40° C to 70° C].

H. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment. In addition, other controls must meet the following requirements:
   1. Shall support flexibility in valve type, the controllers shall be capable of supporting the following valve control types: 0-10VDC, 0-5VDC, 4-20mA, 24VAC - 2 position.
   2. Shall support flexibility in sensor type, the Controller shall be capable of reading sensor input ranges of 0 to10V, 0 to 20mA, 50ms or longer pulses, 200 to 20Kohm and RTD input.
   3. Shall support flexibility in sensor type, all Analog Outputs shall have the additional capability of being programmed to operate as Universal Inputs or Pulse Width Modulation Outputs.

4. Shall support flexibility in sensor type, the Controller and/or expansion modules shall support dry and wetted (24VAC) binary inputs.
5. The controller shall support pulse accumulator for connecting devices like energy meters.
6. In order to support a wide range of devices, the Controller's binary output shall be able to drive at least 10VA each.
7. For future needs, any unused I/O that is not needed for the functionality of the equipment shall be available to be used by custom programs on the Controller and by any other controller on the network.
8. The Controller shall provide 24VAC and 24VDC power terminals sensors and other devices required.
9. The Controller shall provide a dedicated static pressure input.

I. Input/Output Expandability – The Controller shall provide the following functionality in order to meet current and future application needs:
1. For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
2. Expansion I/O can be mounted up to 650 ft. (200m) from control.
3. For optimized system operation, expansion I/O must communicate via an internal controller communication bus (point expansion via the BACnet MS/TP network is not allowed).

J. Serviceability – The Controller shall provide the following in order to improve serviceability of the Controller.
1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
2. Binary and analog inputs and outputs shall use removable connectors or be connected to terminal strip external to the control box.
3. Software service tool connection through the following methods: direct cable connection to the Controller, connection through another controller on BACnet link
4. For safety purposes, the controller shall be capable of being powered by a portable computer's USB port for the purposes of configuration, programming and testing programs so that this work can be accomplished with the power off to the associated equipment.
5. The Controller software tool service port shall utilize standard off-the-shelf USB printer cable.
6. Capabilities to temporarily override the BACnet point values with built-in time expiration in the Controller.
7. To aid in service replacement, the Controller shall easily attached to standard DIN rail mounting.
8. For future expansion, the Controller shall be capable of adding sequence of operation programming utilizing service tools software with a graphical programming interface (editing or programming in line code is not permissible).
9. To aid in service replacement, the Controller shall allow for setting its BACnet address via controller mounted rotary switches that correspond to the numerical value of the address. (DIP switch methodologies are not allowed). Setting of the

address shall be accomplished without the need of a service tool or power applied to the controller.

10. Controller data shall be maintained through a power failure.

K. Software Retention: All Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.

L. Controller must meet the following Agency Compliance:
1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit
4. BACnet Testing Laboratory (BTL) listed as BACnet Advanced Application Controller (B-AAC)

2.07 APPLICATION SPECIFIC CONTROLLERS:

A. General Description
1. Application Specific Controllers (ASC) shall be microprocessor-based DDC controllers which, through hardware or firmware design, control specified equipment. They are not user programmable, but are customized for operation within the confines of the equipment they are designed to serve.
2. Zone Controllers are controllers that operate equipment that control the space temperature of single zone. Examples are controllers for VAV, Fan coil, Blower Coils, Unit Ventilators, Heat Pumps, and Water Source Heat Pumps.

B. The Application Specific Controller shall be capable of operating as a stand-alone controller or as a member of a Building Automation System (BAS).

C. When the Application Specific Controller is operating as a member of a Building Automation System (BAS), the application controller shall operate as follows:
1. Application Controller will receive operation mode commands from the BAS network controller. The BAS commands shall include but not be limited to the follow: Occupied Heat/Cool, Unoccupied Heat/Cool, Morning Warm-up, / Pre-cool, Occupied Bypass).
2. Application Controller will provide equipment status parameters to the BAS through BACnet communication.
3. Application Controller will operate as a stand-alone controller in the event of communication failure with the BAS.
4. In case of communications failure stand-alone operation shall use default values or last known values for remote sensors read over the network such as outdoor air temperature.

D. Stand-Alone Operation: Each piece of equipment specified in section "A" shall be controlled by a single controller and provide stand-alone control in the event that a BAS is not present.

E. Software
1. To meet the sequence of operation for each zone control, the controller shall use programs developed and tested by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.

2. For controlling ancillary devices and for flexibility to change the sequence of operation in the future, the controller shall be capable running custom programs written in a graphical programming language.

F. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.
1. Storage: -55° to 203° F (-48° to 95° C) and 5 to 95% Rh, non-condensing.
2. Operating: -40° to 158° F (-40 to 70° C) and 5 to 95% Rh, non-condensing.
3. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
4. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° to 158° F [-40° to 70° C].

G. Input/Output:
1. For flexibility in selection and replacement of valves, the controllers shall be capable of supporting all of the following valve control types 0-10VDC, 0-5VDC, 4-20mA, 24VAC floating point, 24VAC - 2 position (Normally Open or Normally Closed).
2. For flexibility in selection and replacement of sensors, the controllers shall be capable of reading sensor input ranges of 0 to10V, 0 to 20mA, pulse counts, and 200 to 20Kohm.
3. For flexibility in selection and replacement of binary devices, the controller shall support dry and wetted (24VAC) binary inputs.
4. For flexibility in selection and replacement devices, the controllers shall have binary output which are able to drive at least 12VA each.
5. For flexibility in selection and replacement of motors, the controller shall be capable of outputting 24VAC (binary output), DC voltage (0 to 10VDC minimum range) and PWM (in the 80 to 100 Hz range).
6. For future needs, any I/O that is unused by functionality of equipment control shall be available to be used by custom program on the controller and by another controller on the network.
7. For future expansion and flexibility, the controller shall have either on board or through expansion, 20 hardware input/output points. Expansion points must communicate with the controller via an internal communications bus. Expansion points must be capable of being mounted up to 650ft. (200 m) from the controller. Expansion points that require the BACnet network for communication with the controller are not allowed.

H. Serviceability – The controller shall provide the following in order to improve serviceability of the controller.
1. Diagnostic LEDs shall indicate correct operation or failures/faults for all of the following: power, sensors, BACnet communications, and I/O communications bus.
2. All binary output shall have LED's indicating the output state.
3. All wiring connectors shall removable without the use of a tool.
4. Software service tool connection through all of the following methods: direct cable connection to the controller, connection through another controller on BACnet link

5. For safety purposes, the controller shall be capable of being powered by a portable computer for the purposes of configuration, programming, and testing programs so that this work can be accomplished with the power off to the equipment.
6. Capabilities to temporarily override of BACnet point values with built-in time expiration in the controller.
7. BACnet MAC Address shall be set using decimal (0-9) based rotary switches.
    a. Configuration change shall not be made in a programming environment, but rather by a configuration page utilizing dropdown list, check boxes, and numeric boxes.
8. For ease of troubleshooting, the Controller shall support BACnet data trend logging.
    a. With a minimum of 20,000 trending points total on controller
    b. Trends shall be capable of being collected at a minimum sample rate of once every second.
    c. Shall be capable of trending all BACnet points used by controller
    d. Trends shall be capable of being scheduled or triggered

I. Software Retention: All Zone Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.

J. Application controller shall meet the following Agency Compliance:
1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit
4. BACnet Testing Laboratory (BTL) listed as BACnet Application Specific Controller (B-ASC)

2.08 APPLICATION CONTROLLER for Packaged Rooftop Units

A. The Rooftop Unit (RTU) Application Controller shall be a microprocessor-based DDC controller which, through hardware or firmware design, controls specified equipment. The controller is not user programmable, but is customized for operation within the confines of the equipment it is designed to serve.

B. The Application Controller shall be capable of operating as a stand-alone controller or as a member of a Building Automation System (BAS).

C. When the Application Controller is operating as a member of a Building Automation System (BAS), the application controller shall operate as follows:
1. Application Controller will receive operation mode commands from the BAS network controller. The BAS commands shall include but not be limited to the follow: Occupied Heat/Cool, Unoccupied Heat/Cool, Morning Warm-up, / Pre-cool, Occupied Bypass).
2. Application Controller will provide equipment status parameters to the BAS through BACnet communication.
3. Application Controller will operate as a stand-alone controller in the event of communication failure with the BAS.

4. In case of communications failure stand-alone operation shall use default values or last known values for remote sensors read over the network such as outdoor air temperature.

D. Software
1. To meet the sequence of operation for each zone control, the controller shall use programs developed and tested by the controller manufacturer that are either factory loaded or customized with use of service tool native to the controller.

E. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.
1. Storage: -55° to 203° F (-48° to 95° C) and 5 to 95% Rh, non-condensing.
2. Operating: -40° to 158° F (-40 to 70° C) and 5 to 95% Rh, non-condensing.
3. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
4. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° to 158° F [-40° to 70° C].

F. Controller Input/Output: The controller shall have on board capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment.
1. For flexibility in selection and replacement of valves, the controllers shall be capable of supporting all of the following output types; 0-10VDC, 0-5VDC, 4-20mA, Binary.
2. For flexibility in selection and replacement of sensors, the controllers shall be capable of reading sensor input ranges of 0 to10V, 0 to 20mA, Pulse counts, and 200 to 20Kohm.

G. Serviceability – The controller shall provide the following in order to improve serviceability of the controller.
1. Diagnostic LEDs shall indicate correct operation or failures/faults for all of the following: power, sensors, BACnet communications, and I/O communications bus.
2. All binary output shall have LED's indicating the output state.
3. All wiring connectors shall removable without the use of a tool.
4. Software service tool connection through the following methods: direct cable connection to the controller, connection through another controller on BACnet link.

H. Software Retention: All Zone Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.

I. Controller shall meet the following Agency Compliance:
1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit
4. BACnet Testing Laboratory (BTL) listed

2.09 INPUT/OUTPUT INTERFACE:

A. Hardwired inputs and outputs may tie into the system through building, custom application, or ASCs.

B. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.

C. Binary inputs shall allow the monitoring of on/off signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense "dry contact" closure without external power (other than that provided by the controller) being applied.

D. Pulse accumulation input objects. This type of object shall conform to all the requirements of binary input objects and also accept up to 10 pulses per second for pulse accumulation.

E. Analog inputs shall allow the monitoring of low voltage (0 to 10 VDC), current (4 to 20 mA), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with and field configurable to commonly available sensing devices.

F. Binary outputs shall provide for on/off operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on building and custom application controllers shall have status lights. Outputs shall be selectable for either normally open or normally closed operation.

G. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10VDC or a 4 to 20 mA signal as required to provide proper control of the output device. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.

H. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct-mounted heating coils, zone dampers, radiation, etc.). Control algorithms shall run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.10 POWER SUPPLIES:

A. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish overcurrent protection in both primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in overvoltage and overcurrent protection and shall be able to withstand a 150% current overload for at least three seconds without trip-out or failure.
   a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MIL-STD 810C for shock and vibration.
   b. Line voltage units shall be UL recognized and CSA approved.

2.11 AUXILLARY CONTROL DEVICES:

A. Motorized dampers, unless otherwise specified elsewhere, shall be as follows:
   1. Damper frames shall be 16-gauge galvanized sheet metal or 1/8" extruded aluminum with reinforced corner bracing.
   2. Damper blades shall not exceed 8" in width or 48" in length. Blades are to be suitable for medium velocity performance (2,000 fpm). Blades shall be not less than 16-gauge.
   3. Damper shaft bearings shall be as recommended by manufacturer for application.
   4. All blade edges and top and bottom of the frame shall be provided with compressible seals. Side seals shall be compressible stainless steel. The blade seals shall provide for a maximum leakage rate of 10 CFM per square foot at 2.5" w.c. differential pressure.
   5. All leakage testing and pressure ratings will be based on AMCA Publication 500.
   6. Individual damper sections shall not be larger than 48" x 60". Provide a minimum of one damper actuator per section.

B. Control dampers shall be parallel or opposed blade types as scheduled on drawings.

C. Electric damper/valve actuators
   1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
   2. Where shown, for power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
   3. All rotary spring return actuators shall be capable of both clockwise or counter clockwise spring return operation. Linear actuators shall spring return to the retracted position.
   4. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.
   5. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
   6. Actuators shall be provided with a conduit fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
   7. Actuators shall be Underwriters Laboratories Standard 873 listed.

8. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.

D. Control Valves
1. Control valves shall be two-way or three-way type for two-position or modulating service as scheduled or shown.
2. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
   a. Water Valves:
      1) Two-way: 150% of total system (pump) head.
      2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
   b. Steam Valves: 150% of operating (inlet) pressure.

E. Water Valves
1. Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
2. Sizing Criteria:
   a. Two-position service: Line size.
   b. Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 34.5 kPa (5 psi), whichever is greater.
   c. Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 34.5 kPa (5 psi) maximum.
   d. Valves DN 15 (1/2 in.) through DN 50 (2 in.) shall be bronze body or cast brass ANSI Class 250, spring-loaded, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless-steel ball.
   e. Valves DN 65 (2 1/2 in.) and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.
3. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
   a. Water zone valves—normally open preferred
   b. Heating coils in air handlers - normally open
   c. Chilled-water control valves - normally closed
   d. Other applications—as scheduled or as required by sequences of operation
4. Zone valves shall be sized to meet the control application and they shall maintain their last position in the event of a power failure.

F. Steam Valves
1. Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.
2. Sizing Criteria:
   a. Two-position service: pressure drop 10% to 20% of inlet psig

b. Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig
c. Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig
d. Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans

G. Binary Temperature Devices
1. Low-voltage space thermostat shall be 24 V, bimetal-operated, mercury-switch type, with either adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
2. Line-voltage space thermostat shall be bimetal-actuated, open contact type, or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listed for electrical rating, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
3. Low-limit thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type, with an element of 6 m (20 ft) minimum length. Element shall respond to the lowest temperature sensed by any 30 cm (1 ft) section. The low-limit thermostat shall be manual reset only.

H. Wired Temperature Sensors
1. Temperature sensors shall be RTD or thermistor.
2. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m2 (10 ft2) of duct cross section.
3. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed. The well must withstand the flow velocities in the pipe.
4. Space sensors shall be equipped with setpoint adjustment, override switch, display, and/or communication port as shown on plans.
5. Provide matched temperature sensors for differential temperature measurement.

I. Wired Humidity Sensors
1. Duct and room sensors shall have a sensing range of 20% to 80%.
2. Duct sensors shall be provided with a sampling chamber.

J. Static Pressure Sensors
1. Sensor shall have linear output signal. Zero and span shall be field-adjustable.
2. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.
3. Water pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Sensor shall be complete with 4-20 ma output, required mounting brackets, and block and bleed valves. Mount in location accessible for service.
4. Water differential pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (DP) and maximum static pressure shall be 3,000 psi. Transmitter shall be complete with

4-20 ma output, required mounting brackets, and five-valve manifold. Mount in a location accessible for service.

K. Low Limit Thermostats
1. Safety low limit thermostats shall be vapor-pressure type with an element 6m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any one-foot section.
2. Low limit shall be manual reset only.

L. Wireless Communication Sensors
1. HVAC terminal unit controllers used for zone space control shall use a wired or wireless communication interface to connect to its space zone sensor.
2. Each zone sensor communication interface shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications. Sensing options shall include temperature, relative humidity, CO2, and occupancy.
3. Wireless zone sensors
   a. To check for proper operation, wireless zone temperature sensors shall include a signal strength and battery condition indicators on the zone sensor.
   b. The wireless zone sensor battery life shall provide at least 15 years life under normal operating conditions and must be readily available Lithium size AA, 1.5V.
   c. The wireless zone sensor and receiver addresses shall be held in non-volatile memory to ensure operation through system voltage disturbances and to minimize the risk of incorrect association.
   d. To ensure proper system performance, the wireless zone sensor shall automatically determine when the space temperature is rapidly changing. When the space temperature is readily changing, the space temperature shall be transmitted at least once each 30 seconds. The maximum time between transmissions shall be 15 minutes.

2.12 WIRING AND RACEWAYS:

A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of this specification.

B. All insulated wire to be copper conductors, UL labeled for 90°C (194°F) minimum service.

C. Fiber Optic Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. The sheath shall be UL Listed OFNP in accordance with NEC Article 770. The optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125 µm.

PART 3 EXECUTION

3.01 EXAMINATION:

A. The Contract Documents shall be thoroughly examined for coordination of control devices, their installation, wiring, and commissioning. Coordinate and review mechanical equipment specifications, locations, and identify any discrepancies, conflicts, or

omissions that shall be reported to the Architect/Engineer for resolution before rough-in work is started.

B. The BAS manufacturer shall inspect the jobsite in order to verify that control equipment can be installed as required, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

3.02 PROTECTION:

A. The BAS installation contractor shall protect all work and material from damage by their work or personnel, and shall be liable for all damage thus caused.

B. The BAS manufacturer shall be responsible for their work and equipment until final inspection, testing, and acceptance. The BAS installing contractor shall protect their work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.03 COORDINATION:

A. Site:
   1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
   2. Coordinate and schedule work with all other work in the same area, or with work that is dependent upon other work, to facilitate mutual progress.

B. Submittals. Refer to the "Submittals," section of this specification for requirements.

C. Test and Balance:
   1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
   2. The contractor shall provide training in the use of these tools. This training will be planned for a duration of 4 hours.
   3. In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
   4. The tools used during the test and balance process shall be returned to the contractor at the completion of the testing and balancing.

D. Life Safety:
   1. Duct smoke detectors required for air handler shutdown shall be supplied under Section 26100 of this specification. The contractor shall interlock smoke detectors to air handlers for shutdown as described in the Sequences of Operation for this project.
   2. Smoke dampers and actuators required for duct smoke isolation are provided under Section 26100. The contractor shall interlock these dampers to the air

handlers as described in the Sequences of Operation for this project as applicable.

3. Fire/smoke dampers and actuators required for fire rated walls are provided under another Section 26100. Control of these dampers shall be by 26100

E. Coordination with Controls Specified in Other Sections or Divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:

1. All communication media and equipment shall be provided as specified in the "Communication" section of this specification.
2. Each supplier of a controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.
3. The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this section and those provided under other sections or divisions of this specification.

3.04 GENERAL WORKMANSHIP:

A. Install equipment, piping, wiring/conduit, parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install all equipment in readily accessible locations as defined by National Electric Code (NEC). Control panels shall be attached to structural walls or properly supported in a free-standing configuration, unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.

D. Verify integrity of all control wiring to ensure continuity and freedom from shorts and grounds prior to commencing the startup and commissioning procedures.

E. All control device installation and wiring shall comply with Contract Documents, acceptable industry specifications, and industry standards for performance, reliability, and compatibility. Installation and wiring shall be executed in strict adherence to local codes and standard practices referenced in Contract Documents.

3.05 FIELD QUALITY CONTROL:

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Contract Documents.

B. BAS manufacturer shall continually monitor the field installation for building code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.

C. BAS installing Contractor(s) shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.06 COMMUNICATION WIRING:

A. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.

B. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring.

C. Maximum pulling, tension, and bend radius for cable installation, as specified by the cable manufacturer shall not be exceeded during installation.

D. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.

E. When a cable enters or exits a building, a lighting arrestor must be installed between the line and ground.

F. All runs of communication wiring shall be un-spliced length when the length is commercially available.

G. All communication wiring shall be labeled to indicate origin and destination.

3.07 FIBER OPTIC CABLE:

A. All cabling shall be installed in a neat and workmanlike manner. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

B. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post installation residual cable tension shall be within cable manufacturer's specifications.

C. Fiber optic cabinets, hardware, and cable entering the cabinet shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

3.08 INSTALLATION OF SENSORS:

A. Sensors required for mechanical equipment operation shall be factory installed and wired as specified in mechanical equipment specifications. BAS manufacturer shall be responsible for coordinating these control devices and ensuring the sequence of operations will be met. Installation and wiring shall be in accordance with the BAS manufacturer's recommendations.

B. Sensors that require field mounting shall meet the BAS manufacturer's recommendations and be coordinated with the mechanical equipment they will be associated.

C. Mount sensors rigidly and adequately for the environment the sensor will operate.

D. Room temperature sensors shall be installed on concealed junction boxes properly supported by the block wall framing. For installation in dry wall ceilings, the low voltage sensor wiring can be installed exposed and must meet applicable National and Local Electrical Codes.

E. All wires attached to wall mounted sensors shall be sealed off to prevent air from transmitting in the associated conduit and affecting the room sensor readings.

F. Install duct static pressure tap with tube end facing directly down-stream of air flow.

G. Install space static pressure sensor with static sensing probe applicable for space installation where applicable.

H. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.

I. All pipe mounted temperature sensors shall be installed in matched thermowells. Install all liquid temperature sensors with heat conducting fluid in thermal wells for adequate thermal conductance.

J. Wiring for space sensors shall be concealed in building drywall. EMT conduit is acceptable within mechanical equipment and service rooms.

K. Install outdoor air temperature sensors on north wall complete with sun shield at manufacturer's recommended location and coordinated with Engineer.

3.09 FLOW SWITCH INSTALLATION:

A. Coordinate installation of flow switch with Mechanical Contractor who will be responsible for installing a thread o let in steel piping applications. Copper pipe applications will require the use CxCxF Tee, and no pipe extensions or substitutions will be allowed.

B. Mount a minimum of 5 pipe diameters upstream and 5 pipe diameters downstream, or two feet, whichever is greater, from pipe fittings and other inline potential obstructions.

C. Install in accordance with manufacturers' instructions, which will require proper flow direction, horizontal alignment with flow switch mounting on the top of pipe.

3.10 WARNING LABELS:

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the BAS system.

B. Permanent warning labels shall be affixed to all motor starters and all control panels that are connected to multiple power sources utilizing separate disconnects.

3.11 IDENTIFICATION OF HARDWARE AND WIRING:

A. All field wiring and cabling, including that within factory mounted, and wired control panels and devices for mechanical equipment, shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information for troubleshooting, maintenance, and service purposes. BAS manufacturer to coordinate this labeling requirement with mechanical equipment manufacturer as it relates to controls.

B. Permanently label or code each point of field terminal strips to show the instrument or item served and correlate them to the BAS design drawings.

C. Identify control panels with minimum 1-cm letters on laminated plastic nameplates.

D. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.12 CONTROLLERS:

A. Provide a separate DDC Controller for individual HVAC mechanical equipment. BAS manufacturer shall furnish and coordinate DDC controllers and control devices and ensure that installation and wiring adhere to BAS manufacturer's design recommendations. For those mechanical equipment units that do not have factory installed controls specified, the BAS manufacturer shall field mount controls and coordinate all installation and termination information to ensure the specified sequence of operations are met.

B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of 15% spare I/O point capacity for each point type (analog or digital) found at each location. If input points are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point used in each controller.

1. Future use of spare I/O point capacity shall require providing the field instrument and control device, field wiring, engineering, programming, and commissioning. No additional Controller boards or point modules shall be required to implement use of these spare points.

3.13 PROGRAMMING:

A. Provide sufficient internal memory for all controllers to ensure specified sequence of operations, alarming, trending, and reporting requirements are achieved. BAS manufacturer shall provide a minimum of 25% spare memory capacity for future use.

B. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index.

C. Software Programming

1. Provide programming for individual mechanical systems to achieve all aspects of the sequence of operation specified. It is the BAS manufacturer's responsibility to ensure all mechanical equipment functions and operates as specified in sequence of operations. Provide sufficient programming comments in controller application software to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations.

D. BAS Operator's Interface

1. When Operator Workstation is specified, provide color graphics for each piece of mechanical equipment depicting sufficient I/O to monitor and troubleshoot operation. Operator color graphics shall include Chiller Plant, Cooling Tower System, Boiler Plant, Air Handling Units, Rooftop Units, VAV Terminal Boxes, Fan Coil Units, Unit Ventilators, Heat Exchangers, Exhaust Fans, etc. These standard graphics shall depict all points dynamically as specified in the points list and/or indicated in sequence of operation.
2. The BAS manufacturer shall provide all the labor necessary to install, initialize, start up, and trouble-shoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface data base, and any third-party software installation and integration required for successful operation of the operator interface.

3. As part of this execution phase, the BAS manufacturer shall perform a complete test of the operator interface.

3.14 CONTROL SYSTEM CHECKOUT AND TESTING:

A. Start-up testing. All testing in this section shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.

1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all of the instruments, controls, and accessory equipment furnished under this specification.
2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturer's recommendations.
4. Verify all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starter, etc.) operate properly and normal positions are correct.
5. Verify all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimal start/stop routines.
7. Alarms and Interlocks
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.

3.15 CLEANING:

A. The BAS manufacturer's installing contractor(s) shall clean up all debris resulting from their installation activities on a daily basis. The installation contractors shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed. Waste shall be collected and placed in a location designated by the Owner, Construction Manager, General Contractor, and/or Mechanical Contractor.

B. At the completion of work in any area, the installation contractor shall clean all of their work, equipment, etc., making it free from dust, dirt and debris.

C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage. Any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.16 TRAINING:

A. Provide minimum of (8) hours of operator training throughout the contract period. Training shall consist of a minimum of (2) classroom training sessions of (4) hours for each session. The training will be provided for personnel designated by the Owner.

B. These objectives will be divided into logical groupings; participants may attend one or more of these, depending on level of knowledge required:
   1. Day-to-day BAS Operators
   2. BAS Troubleshooting & Maintenance

C. The instructor(s) shall be factory-trained and experienced in teaching this technical material.

END OF SECTION

SECTION 23 2300
REFRIGERANT AND CONDENSATE PIPING

PART 1 GENERAL

1.01 Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE

A. Interconnecting piping between evaporator-coil and condensing unit on split system packaged units.

B. Equipment condensate drains.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 23 0500 – Common Work Results for Heating, Ventilating, and Air Conditioning System.

B. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 0719 – HVAC Piping Insulation.

PART 2 PRODUCTS

2.01 PIPING

A. Type "L", hard drawn copper (degreased) – refrigerant piping.

B. Type "M" hard drawn copper – condensate drains

2.02 FITTINGS

A. Wrought copper.

2.03 SOLDER

A. Brazing alloy with 1000 °F melting point and suitable flux.

2.04 VALVES

A. Pack-less bellows or diaphragm type for use with Freon type refrigerant.

2.05 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper tubing: ASTM B88, Type M, hard drawn.
   1. Fittings: ANSI/ASME B16.23 cast brass, or ANSI/ASME B16.92 solder wrought copper.
   2. Joint: ASTM B32 solder, Grade 95TA.

2.06 APPROVED MANUFACTURERS

A. Valves:
   1. Mueller Brass Company.
   2. Architect approved equal.

B. Solder:
   1. Phoson Fifteen.
   2. Architect approved equal.

PART 3 EXECUTION

3.01 Install refrigerant accessories as shown on the drawings and as may be recommended by the unit manufacturer.

3.02 Provide double suction risers and pitch lines as required to ensure positive oil return to the compressor.

3.03 Testing shall be done during the progress of work or at completion to ensure a tight system. Change the system with dry nitrogen and soap test hot gas lines at 300 psi and liquid and suction lines at 245 psi. Allow the system to stand for 24 hours under pressure and if a change in pressure, the system may be considered tight.

3.04 Before charging, evacuate the system to 0.15 inches of mercury absolute pressure. All pumps to operate at least four (4) hours at this reading.

3.05 REFRIGERANT CONTAINMENT

A. The contractor shall take all necessary precautions to prevent the accidental or intentional release of refrigerant to the atmosphere.

B. When a sealed system must be broken, provide all necessary equipment and containers as required to pump down the entire system volume, or that volume not contained in isolated receivers on the equipment.

C. The contractor shall clean and re-use refrigerant to the greatest extent possible. Un-used refrigerant shall be properly disposed of or recycled at the Contractor's expense.

3.06 Provide proper charge of refrigerant and oil for proper operation per manufacturer requirements.

3.07 Condensate drains for furnaces and cooling coils shall be combined and routed to floor drains, or as indicated on the drawings. Route piping, as required to not block access to the unit.

3.08 Insulate all condensate drain piping inside the building.

3.09 Condensate drains from outdoor packaged units mounted on concrete pads shall be piped to the edge of the slab in a manner as to not impede access to the unit.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for HVAC Ducts and Casings.

1.02 RELATED SECTIONS

A. Section 23 05 00 – Common Work Results for Heating, Ventilating, and Air Conditioning System.

B. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 07 13 – Duct Insulation.

D. Section 23 05 93 – Testing, Adjusting, and Balancing.

1.03 QUALITY ASSURANCE

A. Installer: A firm with at least 3-years of successful installation experience on projects with low-pressure ductwork systems work, similar to that required for the project.

B. SMACNA Standards: Comply with SMACNA HVAC Duct Construction Standards for fabrication and installation of low-pressure ductwork.

C. NFPA Compliance: Comply with ANSI/NFPA 9OA Standard for the Installation of Air-Conditioning and Ventilating Systems" and ANSI/NFPA 90B "Standard for the Installation of Warm Air Heating and Air-Conditioning Systems" and ANSI/NFPA96 "Standard for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".

D. Field Reference Manual: Have available at the project field office, copy of "SMACNA HVAC Duct Construction Standards", latest Edition.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's specifications on manufactured products and factory-fabricated ductwork, used for work of this section.

B. Record Drawings: At project closeout, submit record drawings of installed ductwork, duct accessories, and outlets and inlets, per requirements of Division 01.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect shop-fabricated and factory-fabricated ductwork, accessories, and purchased products from damage during shipping, storage, and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 PRODUCTS

2.01 LOW-PRESSURE DUCTWORK

A. Fabricate and support per SMACNA HVAC Metal Duct Standard and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing and sealing for operating pressures indicated.

B. Size round ducts installed in place of rectangular ducts per ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

C. Construct T's, bends, and elbows with the radius of not less than 1-1/2 times the width of the

duct on the centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

D. Increase duct sizes gradually, not exceeding 15 ° divergence wherever possible. Divergence upstream of equipment shall not exceed 30 °; convergence downstream shall not exceed 45 °.

E. Provide easements where low-pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

F. Use double nuts and lock washers on threaded rod supports.

G. Provide "paint grip" finish where indicated on drawings.

H. Low pressure flexible ductwork to be lightweight duct, core of corrosion resistant reinforcing wire helix permanently bonded within fabric, insulated with 1-1/2" thick, 3/4 lb. density fiberglass flexible insulation and covered with a vapor barrier of aluminum metalized polyester film laminated to glass mesh, elastomer back coated. Duct shall meet NFPA 90A requirements and be listed as Class 1 Air Duct Material, UL 181. Minimum R-6 insulation value. Maximum length of 36" with no bends.

2.02 HIGH VELOCITY DUCTWORK

A. Includes ductwork from discharge of medium pressure air handlers up to and including flexible ductwork connection to high pressure variable air volume boxes. Maximum velocity 2400 fpm and static pressures above 2 inches WG not to exceed 10 inches WG.

B. Provide galvanized steel ductwork, designed, constructed, installed and tested according to latest edition of SMACNA "HVAC Duct Construction Standards" and as shown on drawings. Ductwork shall have manufacturer's gage stamp.

C. Ductwork and Fittings:
   1. Round and oval ductwork shall be factory fabricated spiral type. Take-offs shall be conical, 90 degrees except where 45-degree conical(s) are indicated on plans. Ninety-degree elbows shall be constructed of not less than 5 sections. Laterals also to be conical. Oval duct reinforcing shall be by exterior stiffener angles on flat surface restrained by rods or angle sections; stiffener spacing to be based on 6 inches WG. Ductwork and fittings shall be the product of one manufacturer.
   2. Rectangular high-pressure ductwork shall be fabricated and installed per SMACNA "Duct Construction Standards". Joints shall be sealed and reinforced, and seams and corners shall be sealed with sealant and angles as required for airtightness. Welded construction shall be as required for pressure classification of each system.

D. Flexible ducts at variable air volume boxes shall be of high-pressure type, maximum 2 feet long. Core and insulation shall be as specified.

E. Acceptable Manufacturers:
   1. Spiral Pipe of Texas
   2. Semco
   3. United McGill
   4. Architect Approved

2.03 FLEXIBLE DUCT CONNECTOR (HIGH VELOCITY)

A. Flexible duct connectors shall be of two-element spiral construction composed of a corrosion-resistant metal supporting spiral and a coated fabric with a mineral base.

B. Flexible duct connectors shall be listed by UL and shall have a flame spread rating not exceeding 25 and a smoke-developed rating not exceeding 30.

C. Lengths shall not exceed 24 inches unless shown otherwise and shall be the same as spiral

run-out or box inlet, whichever is larger.

2.04 DUAL WALL DUCT AND FITTINGS (HIGH VELOCITY)

A. Dual wall duct shall be comprised of an airtight outer pressure shell, a 2-inch insulation layer, and solid metal inner shell. The liner shall be supported by the steel by welded spacers. Where indicated on the drawings, ductwork shall have a perforated inner shell for sound attenuation.

B. Insulation shall fill the space between the liner and outer shell and have the following UL ratings:

Flame Spread	10-20
Fuel Contributed	10-15
Smoke Developed	0-20

C. The outer shell of the duct shall be minimum 20-gauge galvanized steel. The inner liner of the duct shall be minimum 28-gauge galvanized steel.

D. Manufactured end fittings shall be installed at all connections of dual wall and single wall duct.

E. All-round and oval ductwork shall be spiral lock seam pipe. The spiral pipe shall have been laboratory tested for leakage rate, friction loss, bursting, and collapsing strength.

F. Fitting shall be of the standard machine-formed fittings as manufactured by the duct manufacturer. Fittings shall match those shown on the drawings as closely as possible. All fittings shall have a turning radius of 1-1/2 times the diameter of the duct where possible.

G. Provide "paint grip" finish where indicated on drawings.

2.05 SINGLE WALL DUCT AND FITTINGS (HIGH VELOCITY)

A. Round and oval ductwork shall be 26-gauge galvanized steel minimum, spiral locked seam pipe.

B. Fittings shall be machine formed fittings as manufactured by the duct manufacturer. Fittings shall match those shown on the drawings as closely as possible. All fittings shall have a turning radius of 1-1/2 times the diameter of the duct where possible.

2.06 RANGE HOOD AND DISHWASHER HOOD EXHAUST DUCTS

A. Range hood exhaust ducts shall be 14-gauge welded steel. Use radius elbows. Duct construction, joints, cleanouts, and installation shall comply with Chapter 5 of the Arkansas Mechanical Code. U.L. listed pre-fabricated double wall round grease exhaust duct is an acceptable alternative.

B. Dishwasher hood exhaust ductwork shall be 16-gauge aluminum with all joints and seams welded.

C. Insulate range hood exhaust ducts per Section 23 07 13.

D. Insulate dishwasher hood exhaust ducts with 2" wrap-on insulation as specified in Section 23 07 13.

2.07 DRYER VENT

A. Dryer vent duct shall have smooth interior finish with joints running in direction of airflow.

B. Dryer vents shall not be assembled with sheet metal screws or other means which extend into the duct. Seal each joint with non-combustible material.

C. For wall venting, provide vent cap with backdraft damper and no screen. See detail on plans.

D. Provide Complete UL listed kit with everything needed to connect the dryer to wall vent:

- Close fit for 4-in wall clearance.
- 6-ft of flexible pipe.
- 2 close elbows resist crushing and maintain airflow.
- Swivel cuffs on close elbows allow moving dryer without disconnecting.
- Conforms to UL safety requirements.

E. For roof venting, provide a galvanized sheet metal hood with backdraft damper, equal to "Dryer Jack model 486U. Provide an insulated 12" tall insulated roof curb. Secure hood to curb and seal as required. Coordinate with roofing contractor.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Provide openings in ductwork that were required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with a metal cap with spring device or screw to insure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

C. Connect diffusers or troffer boots to low-pressure ducts with 3 feet maximum length of flexible duct. Hold in place with a strap or clamp.

D. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.

E. Seal all traverse joints and longitudinal seams in all ductwork with Hard-cast sealant.

F. Clean the duct system and force air at high velocity through a duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters or bypass during cleaning.

3.02 INSTALLATION (LOW PRESSURE DUCTWORK)

A. Straight and smooth on inside with joints neatly finished unless otherwise directed.

B. Duct panels through a 48-inch dimension having acoustic duct liner need not be cross-broken or beaded.

C. Cross-break all unlined duct and lined duct panels larger than 48 inches or bead 12 inches on center.

D. Securely anchor ducts to building structure with specified duct hangers attached with screws.

E. Brace and install ducts so they shall be free of vibration under all conditions of operation.

F. Ducts shall not bear on the top of structural members.

G. Make duct take-offs to branches, registers, grilles, and diffusers as detailed on drawings.

H. Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on drawings are actual sheet metal sizes.

I. Properly flash where ducts penetrate above the roof.

J. Install internal ends of slip joints in direction of flow. Make joints airtight using a mastic type duct sealer.

K. Cover horizontal and longitudinal joints on the exterior of ducts with two (2) layers of Hard-cast tape installed with Hard-cast, HC-20 adhesive according to manufacturer's recommendations.

L. All longitudinal seams shall be Pittsburgh Lock seams. All ductwork shall be strengthened by

diamond crimping of the sheets.

M. All elbows shall have a throat radius equal to the width of the duct wherever possible. Air Turns, as manufactured by Tuttle & Bailey, Inc., or approved locally made vanes, shall be installed in all square elbows. Horizontal ducts over 400 square inches in cross-sectional area shall be supported from overhead structure members by 3/4-inch x 1/8-inch strap iron. Horizontal ducts, under 400 square inches in cross-sectional area shall be supported from an overhead structure with the use of 1 inch wide 18-gauge galvanized metal straps.

3.03 DUCT SEALS

A. All ductwork shall be either welded or joint shall be sealed with duct sealer, sheet metal screws, and duct tape. The sealing procedure shall be as follows:
   1. Apply duct sealer to fittings and slip fitting or coupling into a duct.
   2. Install sheet metal screws at 8 inches on centers as close to fitting head as possible with a minimum of three (3) screws per fitting.
   3. Apply a layer of sealer to the outside of the joint, approximately 2-1/2 inches wide. Make sure that sheet metal screw heads are completely covered, as well as joint and coupling head.
   4. Apply a single pass of duct tape over the wet sealer. Pull tight and smooth to make complete contact.

3.04 Exterior ducts shall be covered with rigid insulation and protective covering.

3.05 Paint ductwork visible through registers, grilles, and diffusers flat black.

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for Air Duct Accessories for complete Heating, Ventilating, and Air Conditioning Systems.

1.02 RELATED SECTIONS

A. Section 23 0500 – Common Work Results for Heating, Ventilating, and Air Conditioning Controls.

B. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 3100 – HVAC Ducts and Casings.

D. Section 23 0593 – Testing, Adjusting, and Balancing.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacturer of duct accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) high pressure and low-pressure duct construction standards.

C. Industry Standards: Comply with the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations of construction of duct accessories, except as otherwise indicated.

D. UL Compliance: Construct, test, and label fire dampers per Underwriters Laboratories (UL) Standard 555 "Fire Dampers and Ceiling Dampers".

E. NFPA Compliance: Comply with applicable provisions of ANSI/NFPA 9OA "Air Conditioning and Ventilating Systems", of installation of duct accessories.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data for each type of duct construction; and installation instructions.

B. Shop Drawings: Submit assembly-type shop drawings for each type of duct assembly showing interfacing requirements with ductwork and method of fastening or support.

C. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory include this data in Maintenance Manual.

PART 2 PRODUCTS

2.01 DAMPERS

A. Low-Pressure Manual Dampers: Provide dampers of single blade type of multi-blade type, constructed per SMACNA "Low-Pressure Duct Standards".

B. Control Dampers: Refer to Division 23 section "Temperature Control Systems" for control dampers; not work of this section.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering dampers which may be incorporated in the work include, but are not limited to, the following:

Air Balance, Inc.
Airguide Corp.
Airstream Products Div., Penn Ventilator Co., Inc
American Warming & Ventilating, Inc.
Arrow Louver and Damper Corp
Elgo Shutter and Mfg. Co
Imperial Damper and Louver Co., Inc
Louvers & Dampers
Ruskin Mfg. Co.

2.02 FIRE AND SMOKE DAMPERS

A. Fire Dampers: Provide fire dampers, of types and sizes, indicated. Construct casings of 11 gauge galvanized steel with bonded red acrylic enamel finish. Provide fusible link rated at 160-165 °F (71-74 °C) unless otherwise indicated. Provide damper with positive lock in a closed position, and with the following additional features:
   1. Damper Blade Assembly: Single-blade type (ducts less than 10 inches deep).
   2. Damper Blade Assembly: Curtain type.
   3. Blade Material: Steel, match casing.

B. Motor-Driven Smoke Dampers: Provide smoke damper, resettable type linkage of sizes indicated, designed and constructed per NFPA-9OA, motor operated, frame constructed of 10-gauge galvanized steel with provisions for securing to building and attaching to ducts, electric motor operator, casing to have a bonded red acrylic enamel finish, low leakage with friction-free metal seals, 32" long wire leads for connecting to smoke detector, and the following additional features:
   1. Damper Blade Assembly: Single-blade type (ducts less than 10 inches deep).
   2. Damper Blade Assembly: Multi-blade type.
   3. Blade Material: Steel, matching casing.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fire and smoke dampers which may be incorporated in the work include, but are not limited to, the following:
Air Balance, Inc.
Airstream Products Div., Penn Ventilator Co, Inc
American Warming & Ventilating, Inc.
Arrow Louver and Damper Corp
Louvers & Dampers
Phillips-Aire
Ruskin Mfg. Co.

2.03 TURNING VANES

A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed per SMACNA "Low-Pressure Duct Standards".

B. Manufactured Turning Vanes: Provide turning vanes constructed of 1-1/2 inch wide curved blades set at 1-1/2 inch o.c., supported with bars perpendicular to blades set at 2 inches o.c., and set into side strips suitable for mounting in ductwork, per SMACNA Standards for low-pressure duct.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering turning vanes which may be incorporated in the work include, but are not limited to, the following:
Air Filter Corp.
Anemostat Products Div., Dynamics Corp. of America
Duro-Dyne Corp.
Environmental Elements Corp., Subs. Koppers Co., Inc.
Tuttle & Bailey Div. of Interpace Corp.

2.04 DUCT HARDWARE

A. General: Provide duct hardware, manufactured by one manufacturer for all items on a project, for the following:
   1. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
   2. Quadrant Locks: Provide for each damper, quadrant lock device on one end of the shaft; and end bearing plate on another end for damper lengths over 12 inches. Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering duct hardware which may be incorporated in the work include, but are not limited to, the following:

   Ventfabrics, Inc.
   Young Regulator Co.

2.05 DUCT ACCESS DOORS

A. General: Provide, where indicated and at all fire and smoke dampers, duct access doors of the size indicated.

B. Construction: Construct of same or greater gage as ductwork served, provide double panel insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, another side with 1 handle-type latch for doors 12 inches high and smaller, 2 handle-type latches for larger doors.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering duct access doors which may be incorporated in the work include, but are not limited to, the following:
   Air Balance Inc.
   Duro Dyne Corp.
   Register & Grille Mfg. Co., Inc.
   Ruskin Mfg. Co.
   Semco
   Ventfabrics, Inc.
   Zurn Industries, Inc., Air Systems Div.

2.06 FLEXIBLE CONNECTIONS

A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.07 DUCT ACCESS DOOR/PRESSURE RELIEF DOOR

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which duct accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install duct accessories per manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and per recognized industry practices to ensure that products serve intended function.

B. Install turning vanes in square or rectangular 90 ° elbows in supply.

C. Install access doors to open against system air pressure, with latches operable from either side, except outside only where the duct is too small for a person to enter.

D. Coordinate with other work, including ductwork, as necessary to interface installation of duct accessories properly with other work.

E. Field Quality Control: Operate installed duct accessories to demonstrate compliance with requirements. Test for air leakage while the system is operating. Repair or replace faulty accessories as required to obtain proper operation and leak-proof performance.

END OF SECTION

SECTION 23 3423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: HVAC Power Ventilators
   1. 23 0000 Heating, Ventilating, and Air-Conditioning (HVAC)
   2. 26 0000 Electrical

1.02 REFERENCES

A. Air Movement and Control Association Inc. (AMCA):
   1. 99 - Standards Handbook
   2. 200 - Publication, Air Systems
   3. 201-90 - Publication, Fans, and Systems
   4. 202-88 - Publication, Troubleshooting
   5. 203-90 - Publication, Field Performance Measurement of Fan Systems
   6. 211-05 - Publication, Certified Ratings Program – Product Rating Manual for Fan Air Performance
   7. 300-96 - Standard Reverberant Room Method for Sound Testing of Fans
   8. 311-05 - Publication Certified Rating Program – Product Rating Manual for Fan Sound Performance
   9. 99-0401-86 - Classification for Spark Resistant Construction
   10. 99-2408-69 - Operating Limits for Centrifugal Fans

B. Air Movement and Control Association Inc. (AMCA), American National Standards Institute (ANSI):
   1. 204-05 - Standard Balance Quality and Vibration Levels for Fans
   2. 210-99 - Standard Laboratory Methods of Testing Fans for Aerodynamic Performance Rating

C. American Society of Civil Engineers (ASCE):
   1. 7-02 - Minimum Design Loads for Building and Other Structures

D. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):
   1. Chapter 45 - 2003 handbook, HVAC Applications
   2. Chapter 7 - 2001 Fundamentals handbook, Sound-Vibration
   3. Chapter 32 - 2001 Fundamentals handbook, Duct Design
   4. Chapter 18 - 1992 HVAC System and Equipment handbook, Fans

E. National Fire Protection Association (NFPA)
   1. 70 - National Electrical Code
   2. 90A-02 - Standard for the Installation of Air-Conditioning and Ventilating Systems
   3. 92A-06 - Recommend Practice for Smoke-Control System
   4. 92B-05 - Standard for Smoke Management System in Malls, Atria, and Large Areas
   5. 96-04 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

F. Occupational Safety and Health Administration (OSHA):
   1. 1910.212 - General requirements for Machine Guarding
   2. 1910.219 - General requirements for guarding safe use of mechanical power transmission apparatus
   3. 1926.300 - General requirements for safe operation and maintenance of hand and power tools

G. Underwriters Laboratories (UL):
   1. 507 - Electric Fans
   2. 555 - Fire Dampers
   3. 555S - Smoke Dampers
   4. 705 - Standard Power Ventilators
   5. 762 - Standard Power Roof Ventilators for Restaurant Exhaust Appliances
   6. 793 - Snow Load

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 3300 Submittal Procedures

B. Provide dimensional drawings and product data on each fan.

C. Provide fan curves for each fan at the specified operation point, with the flow, static pressure, and horsepower clearly plotted.

D. Provide outlet velocity and fan's inlet sound power readings for the eight-octave bands, decibels, and sones.

E. Strictly adhere to QUALITY ASSURANCE requirements as stated in section 1.04 of this specification.

F. Provide manufacturer's certification that exhaust fans are licensed to bear Air Movement and Control Association (AMCA), Certified Rating Seal for sound and air performance.

G. Installation, Operation, and Maintenance Manual (IOM): Provide manufacturer's installation, operations, and maintenance manual, including instructions on installation, operations, maintenance, pulley adjustment, receiving, handling, storage, and safety information and cleaning. A troubleshooting guide, parts list, warranty, and electrical wiring diagrams.

1.04 QUALITY ASSURANCE

A. Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-99 and AMCA Standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for air and sound performance seal.

B. Classification for Spark Resistant Construction, levels A, B, and C conform to AMCA 99

C. Each fan shall be given a balancing analysis that is applied to wheels at the outside radius. The maximum allowable static and dynamic imbalance is 0.05 ounces (Balance grade of G6.3).

D. Comply with the National Electrical Manufacturers Association (NEMA), standards for motors and electrical accessories.

E. The High Wind models have been analyzed and stamped by a state license P.E. to the ASCE 7-02 Standard which meets the IBC, Florida, and Miami-Dade codes.

F. Each High Wind model is subject to be certified by a third party to the ASTM E330 Static Pressure Difference Standard.

G. All High Wind models have been analyzed using Computational Fluid Dynamics (CFD). The CFD simulates the flow of high speed (150MPH) winds over the surface of objects.

H. The Finite Element Analysis (FEA) is the result of the CFD and it can accurately predict the stress, strain, and deflection resulting from high wind loads.

1.05 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.

B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with the manufacturer's instructions. For the long term, storage follows the manufacturer's Installation, Operations, and Maintenance Manual.

C. Handling: Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer

1.06 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by an authorized company official. The manufacturer's warranty is in addition to, and not a limitation of, other rights the Owner may have under Contract Documents.
   1. The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts that prove defective during the warranty period will be replaced at the Manufacturers option when returned to Manufacturer, transportation prepaid.
   2. Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

1.07 MAINTENANCE

A. Refer to Manufacturer's Installation, Operation, and Maintenance Manual (IOM), to find maintenance procedures.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Greenheck

B. Cook

C. Architect Approved

2.02 DIRECT DRIVE ROOF DOWNBLAST CENTRIFUGAL EXHAUST FANS - GREENHECK MODEL G

A. General Description:
   1. Down-blast fan shall be for roof-mounted applications
   2. Performance capabilities up to 4,300 cubic feet per minute (cfm) and static pressure to 1 inch of water gauge.
   3. Fans are available in sixteen sizes with nominal wheel diameters ranging from 8 inches through 18 inches (071 - 180 unit sizes)
   4. Maximum continuous operating temperature is 180 °F (82.2 °C)
   5. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel:
   1. Constructed of aluminum
   2. Non-overloading, backward inclined centrifugal
   3. Statically and dynamically balanced in accordance with AMCA Standard 204-05
   4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency.

C. Motors:
   1. AC Induction Motor
      a. Motor enclosures: Open drip-proof
      b. Motors are permanently lubricated, heavy-duty ball bearing type to match with the fan load and furnished at the specified voltage and phase
      c. Mounted on vibration isolators, out of the airstream
      d. For motor cooling, there shall be fresh air drawn into the motor compartment through an area free of discharge contaminants
      e. Accessible for maintenance

D. Housing:
   1. Motor cover, shroud, curb cap, and lower wind-band shall be constructed of heavy gauge aluminum
   2. Shroud shall have an integral rolled bead for extra strength
   3. Shroud shall be drawn from a disc and direct air downward
   4. Lower wind-band shall have a formed edge for added strength
   5. Motor cover shall be drawn from a disc
   6. All housing components shall have final thicknesses equal to or greater then preformed thickness.
   7. Curb cap shall have pre-punched mounting holes to ensure correct attachment
   8. A rigid internal support structure
   9. Leak-proof

E. Housing Supports and Drive Frame:
   1. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators

F. Vibration Isolation:
   1. Rubber isolators
   2. Sized to match the weight of each fan

G. Disconnect Switches:
   1. NEMA rated: [1]
   2. Positive electrical shut-off
   3. Wired from fan motor to junction box installed within the motor compartment

H. Options/Accessories:
   1. Bird screen:
      a. Material Type: [Aluminum
      b. Protects fan discharge
   2. Roof Curbs:
      a. Types: Standing Seam Metal Roof Curb
      b. Mounted onto the roof with fan
      c. Material: [Aluminum] [Galvanized]
      d. Insulation thickness: 1 inch
      e. Coating Type: None
   3. Curb Seal:
      a. The rubber seal between the fan and the roof curb
      b. Type: [Gravity]
      c. Prevents outside air from entering back into the building when the fan is off
      d. Balanced for minimal resistance to flow
      e. Galvanized frames with pre-punched mounting holes
   4. Finishes:
      a. Types: None

2.03 DIRECT DRIVE DELUXE CEILING MOUNTED CENTRIFUGAL EXHAUST FANS - GREENHECK MODEL SP-B

A. General Description:
   1. Base fan performance at standard conditions (density 0.075 Lb./ft3)
   2. Ceiling mounted applications
   3. Performance capabilities up to 200 cubic feet per minute (cfm) and static pressure to 0.75 inches of water gauge
   4. Fans are available in nineteen sizes (50 - 200 unit sizes)
   5. Maximum operating temperatures is 130 °F (54.4 °C)
   6. Sound levels as low as 1.7 AMCA sones
   7. UL/cUL listed for above bathtub exhaust
   8. Fans are UL/cUL listed 507 - Electric Fans
   9. Each fan shall bear a permanently affixed manufacture's nameplate containing the model number and individual serial number

B. Wheel:
   1. Forward curved centrifugal wheel
   2. Constructed of calcium carbonate filled polypropylene
   3. Statically and dynamically balanced in accordance with AMCA Standard 204-05

C. Motors:
   1. Motor enclosures shall be open drip-proof (ODP), opening in the frame body and or end brackets
   2. Motors are permanently lubricated sleeve bearing type to match with the fan load and furnished at the specified voltage and phase
   3. Motors shall be mounted on vibration isolators and be accessible for maintenance
   4. Compatible for use with speed controls
   5. Thermal overload protection

D. Housing:
   1. Constructed of heavy gauge galvanized steel
   2. Profile as low as 6 15/16 inches

E. Aluminum Backdraft Damper:
   1. Prevents air from entering back into the building when the fan is off
   2. Eliminates rattling or unwanted backdrafts

F. Outlet:
   1. Steel duct collar shall be six or four inches in diameter to accept a six or four-inch round ductwork.
   2. Shall include a backdraft damper

G. Grille:
   1. Types: Provide optional aluminum grille.
   2. Constructed of high impact polystyrene plastic shall be factory standard on all units. (Not for this Project.)
   3. Attached to the housing with screws

H. Mounting Brackets:
   1. Fully adjustable for multiple installation conditions

I. Options/Accessories:
   1. Disconnect Switches:
      a. NEMA rated: 1
      b. Positive electrical shut-off
      c. Access for wiring shall be external

2. Grille Filter:
    a. Washable aluminum mesh filter that goes between fan and grille
    b. Reduces sound levels
    c. Traps dirt before entering the fan.
3. Speed Controls:
    a. Controls the fan's output
    b. The fan can be adjusted to 60 percent of full speed
    c. Can be used to operate more than one fan at a time
4. Wall Discharge:
5. Type: [Round Connection, hooded wall cap model WC] [Square/Rectangular Connection, hooded wall cap model WC
6. Vibration Kit:
    a. Available for suspended installations
    b. Includes a pre-punched hole for ease of installation and shall have all hardware to mount one unit.

2.04 HIGH PLUME LABORATORY EXHAUST FANS

A. General
1. Base fan performance at standard conditions (density 0.075 Lb. /ft^3).
2. Fans selected shall be capable of accommodating static pressure and flow variations of +/- 15% of scheduled values.
3. Each fan shall be belt-driven.
4. Each fan to be equipped with 316 stainless steel lifting lugs for corrosion resistance.
5. Fasteners exposed to corrosive exhaust shall be stainless steel.
6. Fan assembly shall be designed for a minimum of 125 MPH wind loading, without the use of guy wires.

B. Corrosion Resistant Coating
1. All steel fan and system components (fan, nozzle, wind-band, and plenum) shall be Corrosion-resistant coated with LabCoat™, a two-part electrostatically applied and baked, sustainable, corrosion-resistant coating system. Standard finish color, to be RAL-7023, concrete grey.
2. All parts shall be cleaned and chemically prepared for coating using a multi-stage wash system which includes acid pickling that removes oxide, increases surface area, and improves coating bond to the substrate.
3. The first powder coat applied over the prepared surface shall be a zinc-rich epoxy primer (no less than 70% zinc) and heated to a gelatinous consistency (partial cure) at which the second powder coat of polyester resin shall be electrostatically applied and simultaneously be cured at a uniform temperature of 400 °F.
4. The coating system, a total thickness of up to 6 mils, is not affected by the UV component of sunlight (does not chalk) and has superior corrosion resistance to acid, alkali, and solvents. The coating system shall exceed 4000 hour ASTM B117 Salt Spray Resistance.

    Note that 10-20 mil thick wet coating systems pollute the environment (air and water) and that these manually applied coatings are not uniform over the impeller surface and can cause fan imbalance and vibration.

C. Fan Housing and Outlet
1. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
2. Fan housing shall be welded steel and meet specification section 2.15 for corrosion-resistant coating. No uncoated metal fan parts shall be acceptable.

3. Load-bearing or structural fan components that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and/or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
4. A high-velocity conical discharge nozzle shall be supplied by the fan manufacturer and be designed to efficiently handle an outlet velocity of up to 6000 FPM (30.48 m/s). Discharge nozzles shall be steel with corrosion-resistant coating or chemical resistant medium density polyethylene with UV inhibitors to prevent chalking and have smooth interior surfaces. Discharge stack caps or hinged covers, impeding exhaust flow shall not be permitted.
5. Provide housing drain for the removal of rain and condensation.
6. A bolted and gasketed access door shall be supplied in the fan housing allowing for impeller inspection or removal of the impeller, shaft, and bearings without removal of the fan housing.

D. FAN IMPELLER

1. Fan impeller shall be centrifugal, backward inclined, with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically per AMCA Standard 204.
2. Fan impeller shall be manufactured of aluminum (AMCA type B spark resistant), fully welded, and meet specification section 2.15 for corrosion-resistant coating.

E. FAN BYPASS AIR PLENUM

1. For constant volume systems, the fan shall be connected directly to the exhaust duct without the need for a bypass air plenum. Fans mounted directly to roof curbs shall be provided with a damper tray located in the roof curb for mounting of the gravity isolation damper.
2. A fan isolation damper, either gravity backdraft or two positions actuated, fabricated of steel or aluminum and coated with minimum 4 mils of Hi-Pro Polyester resin, electrostatically applied and baked, shall be provided as shown on the project documents.
3. Blower / Plenum vibration isolation shall be limited to neoprene/cork vibration pads.

F. CURB

1. Exhaust system manufacturer shall supply a structural support curb for the plenum, of specified height, as shown on the drawings.
2. Curb shall be fabricated of a minimum of 14 gauge of galvanized and structurally reinforced.
3. Curbs shall be insulated.
4. When properly anchored to the roof structure, the standard curb/plenum/blower assembly shall withstand wind loads of up to 125 mph without additional structural support.

G. FAN MOTORS AND DRIVE

1. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor. A factory-mounted NEMA 3R disconnect switch shall be provided for each fan. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components.
2. Drive belts and sheaves shall be sized for 200% of the motor horsepower and shall be readily and easily accessible for service if required. Drive shall consist of a minimum of two belts under all circumstances.
3. Fan shaft to be turned and polished of 1040 steel material as standard, coated with corrosion-resistant coating.
4. Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type, and be sized for an L-10 life of no less than 100,000 hours. Bearings shall be fixed to the fan shaft

using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.

5. All shaft bearings shall have extended lube lines with Zerk fittings.

2.05 EXECUTION

A. EXAMINATION

1. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

B. INSTALLATION

1. Install fans as indicated, with flexible electrical leads.
2. Pipe housing drain to the nearest drain.
3. Install fans in accordance with the manufacturer's Installation, Operation, and Maintenance manual.

C. ACCEPTABLE MANUFACTURERS

1. Greenheck Fan Corp, PO Box 410, Schofield WI 54476-0410, www.greenheck.com Model Vektor-H [with UL762], High Plume Laboratory Exhaust System.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions

3.02 EXAMINATION

A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected

3.03 PREPARATION

A. Ensure roof openings are square, accurately aligned, correctly located, and intolerance

B. Ensure the duct is plumb, sized correctly, and to proper elevation above the roof deck. Install duct as specified in Air Distribution (Division 23)

3.04 INSTALLATION

A. Install fans system as indicated on the Installation, Operation, and Maintenance Manual (IOM) and contract drawings

B. Install fans in accordance with manufacturer's instructions

3.05 SYSTEM STARTUP

A. Refer to Installation, Operation, and Maintenance Manual (IOM)

3.06 ADJUSTING

A. Adjust exhaust fans to function properly

B. Adjust Belt Tension

C. Lubricate bearings

D. Adjust drive for final system balancing

E. Check wheel overlap

3.07 CLEANING

A. Clean as recommended by the manufacturer. Do not use material or methods which may damage finish surface or surrounding construction

3.08 PROTECTION

A. Protect installed product and finished surfaces from damage during construction

B. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion

END OF SECTION

SECTION 23 3700
AIR INLETS AND OUTLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Requirements for Air Inlets and Outlets.

1.02 RELATED SECTIONS

A. Section 23 0500 – Common Work Results for Heating, Ventilating, and Air Conditioning System.

B. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 3100 – HVAC Ducts and Casings.

D. Section 23 0593 – Testing, Adjusting, and Balancing.

1.03 REFERENCES

A. ADC 1062 - Certification, Rating, and Test Manual.

B. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

C. ARI 650 - Air Outlets and Inlets.

D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

E. SMACNA - Low-Pressure Duct Construction Standard.

1.04 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets per ADC Equipment Test Code 1062 and ASHRAE 70.

B. Air distribution devices have been specifically selected based on the specified manufacturer's performance data. If the Contractor submits on devices other than those specified the submittal must include an item-by-item selection of substitutions listed by space location.

C. Where compliance with performance requires different dimensions, such as neck or face size than the specified item, the submittal must note where these dimension changes occur listing both the original and the new dimensions.

D. Any additional costs by any trade resultant from air device substitution shall be borne by the Contractor.

1.05 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

1.06 SUBMITTALS

A. Submit product data under provisions of Division 01 and Section 23 0500.

B. Submit a schedule of air devices indicating type, size, location, and application.

C. The schedule must include model number, size, air pattern, CFM, pressure drop, throw NC noise level, finish, and mounting method for both the submitted and a specified device.

D. Review requirements of outlets and inlets as to size, finish, and type of mounting before submitting product data and schedules of outlets and inlets.

E. Submit manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 AIR DEVICES

A. All air devices shall be equal to products scheduled on the Drawings.

2.02 LOUVERS (ALUMINUM)

A. Frame shall be a 6-inch-deep channel of .081 inch thick 6063-T5 extruded aluminum alloy.

B. Blades shall be constructed of .081-inch-thick aluminum. Blades shall be adjustable and drainable.

C. Insect screen shall be aluminum mesh, removable type. The screen shall be mounted on the exterior of the louver.

D. Finish shall be as selected by Architect.

2.03 APPROVED MANUFACTURERS

A. Air Devices
   1. Tuttle & Bailey.
   2. Price
   3. Metal Aire
   4. Architect Approved.

B. Louvers
   1. American Warming and Ventilating LE-31.
   2. Ruskin.
   3. Architect Approved.

PART 3 EXECUTION

3.01 INSTALLATION (AIR DEVICES)

A. Install air devices per the manufacturer's instructions.

B. Check the location of air devices and make necessary adjustments in position to conform to architectural reflected ceiling plan, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with the airtight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Provide mounting frame or additional ceiling grid tees as required to mount air devices. Support devices as required to prevent ceiling sag.

3.02 INSTALLATION (LOUVERS)

A. Locate and place louver units, plumb, level, and in proper alignment with adjacent work.

B. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws were required to protect metal surfaces and to make a weathertight connection.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joints fillers, as indicated.

D. Repair finishes damaged by installation operations. Restore finishes so that there is no evidence of corrective work. Return items that cannot be refinished in the field to the shop, make the required alterations and refinish the entire unit, or provide a new unit, at the contractor's option.

E. Protection non-ferrous metal surfaces from corrosion or galvanic action by application of a

heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

F. Provide concealed gaskets, flashings, joint fillers, and insulations, and install as work progresses to make the installations weathertight.

G. Refer to Division 7, Section 07 900, for sealants in connection with the installation of louvers.

H. Field verified exact opening dimensions and coordinate mounting requirements with General Contractor.

END OF SECTION

SECTION 23 3716
FABRIC DUCT SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION OF WORK:

A. The extent of non-metal ductwork is indicated on drawings and by requirements of this section.

B. Types of non-metal ductwork required for this project include the following:
   1. Textile Air Dispersion Products.

1.02 QUALITY ASSURANCE:

A. Building Codes and Standards:
   1. The product must be Classified by Underwriter's Laboratories per the 25/50 flame spread/smoke developed requirements of NFPA 90-A and UL 2518. Also Classified by UL-C (Canada) S102.2, BS 5867 Part 2, 1980; GB8624-2006.
   2. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.

B. Design & Quality Control
   1. The manufacturer must have documented design support information including duct sizing; vent, orifice, and/or nozzle location; vent, orifice, and/or nozzle sizing; length; and suspension. Parameters for design, including maximum air temperature, velocity, pressure, and textile permeability, shall be considered and documented.

1.03 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications on materials and manufactured products used for the work of this section.

B. Building Code Data: Submit UL file number under which product is Classified by Underwriter's Laboratories for both NFPA 90-A and UL 2518.

C. Provide detailed drawings confirming the configuration of the Textile Dispersion System (diameter, lengths, airflow, pressure, and textile permeability).

D. Provide detailed installation instructions for components to be installed.

E. Provide warranty and maintenance documentation.

1.04 WARRANTY:

A. The manufacturer must provide a 10 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Protect textile air dispersion system and Hoops (IHS) components from damage during shipping, storage, and handling.

B. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

PART 2 PRODUCTS

2.01 MANUFACTURER:

Subject to compliance with requirements, choose one of the following:

A. DuctSox® Corporation
   Phone: (866) DUCTSOX or (563) 588-5300
   FAX: (866) 398-1646 or (563) 588-5330
   www.DuctSox.com

B. Architect Approved.

2.02 TEXTILE AIR DISPERSION SYSTEM:

A. Hoops (IHS) System: Air diffusers shall be constructed with an internal retention system.
   1. The system shall consist of an internal 360-degree hoop system, spaced 5' on center.
   2. The system shall be installed with a one-row suspension system located 1.5" above top-dead-center of the textile system.
   3. System attachment to cable or U-Track shall be made using Gliders spaced 12 inches.
   4. Available for diameters from 8" – 60".
   5. One row suspension options (must specify if multiple on the same project)
      a. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
         1) Cable suspension options (must specify if multiple on the same project)
            a) Galvanized steel cable
            b) Stainless steel cable
            c) Impregnated steel cable (required for natatorium applications)
         2) Support lengths available in 5'(standard), 10', 15', & 30'.
      b. U-Track suspension hardware to include 8' sections of aluminum track, aluminum splice connectors, track endcaps, and vertical cable support kits – consisting of a length of cable with cable connectors. Radius aluminum track must be included for all horizontal/flat radius sections.
         1) U-Track suspension options (must specify if multiple on the same project)
            a) Galvanized steel cable
            b) Stainless steel cable
            c) Impregnated steel cable (required for natatorium applications)
         2) Support lengths available in 5'(standard), 10', 15', & 30'
      c. U-Track Surface Mount hardware to include 8' sections of aluminum track, aluminum splice connectors, track endcaps, and U-Track suspension attachments. Radius aluminum track must be included for all horizontal/flat radius sections.
         1) U-Track Surface Mount suspension options (must specify if multiple on the same project)
            a) U-Clip spring attachment
            b) U-Clip spring attachment with T-Bar clip and rivet

B. TEXTILE
   1. Verona
      a. Textile Construction: Filament/filament twill polyester, fire-retardant per UL 2518.
      b. Air Permeability: 2 (+2/-1) CFM/ft^2 per ASTM D737, Frazier
      c. Weight: 6.2 oz. /yd^2 per ASTM D3776
      d. Warranty: 10 years
   2. Textile Color
      a. Standard: blue, white, tan, red, green, silver, black
      b. Custom

C. TEXTILE SYSTEM FABRICATION REQUIREMENTS:
   1. Textile system to be constructed in modular lengths (zippered) with proper radial securing clips (inlets, endcaps, and mid-sections) and top access zippers for vertical cable safety attachment.
   2. Integrated air dispersion shall be specified and approved by the manufacturer. (Select only those that apply)
      a. Linear Vents
         1) Air dispersion accomplished by the linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. The linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on the fabric surface.

2) Size of vent openings and the location of linear vents to be specified and approved by the manufacturer.

b. Orifices – 2" & 3" SG's (Sewn-in Grommets)
   1) Air dispersion and extended throws are accomplished by reinforced orifices and permeable fabric. Reinforced orifices are to be installed to keep the integrity of opening and withstand laundry processes.
   2) Diameter, quantity, and location of reinforced orifices to be specified and approved by the manufacturer.

c. Fixed Nozzles
   1) Air dispersion accomplished by using conical aerodynamic nozzles and permeable fabric. The diameter of nozzles; height to be minimum ½". Due to the exact requirements of throw and maximum level of noise alternative flow models are not acceptable.
   2) The color of nozzles must match the color of the fabric. Unless specifically mentioned on drawings or otherwise in this specification, suppliers' standard table is used for selection of color.
   3) Location and number of nozzles to be specified and approved by the manufacturer.

d. Adjustable Nozzles
   1) Air dispersion accomplished by adjustable ball nozzles and permeable fabric. Adjustable ball nozzles to have multiaxial rotation to redirect airflow to the desired area. Adjustable ball nozzles can completely close off airflow without adding caps or plugs. Adjustable ball nozzles should lock into place once set, preventing constant adjustment. Adjustable ball nozzle should have an inset design to be a condensation resistant product.
   2) Colors of adjustable nozzles available are white and black. With white material receiving white adjustable nozzles and all other material colors receiving black adjustable nozzles unless otherwise specifically mentioned on drawings or otherwise in the specification.
   3) Quantity and location of adjustable ball nozzles to be specified and approved by the manufacturer.

3. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by the manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener – supplied by the contractor.
4. Inlet connection includes a zipper for easy removal/maintenance.
5. Lengths to include required intermediate zippers as specified by the manufacturer.
6. System to include Adjustable Flow Devices to balance turbulence, airflow, and distribution as needed. Flow restriction device shall include the ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
7. The end cap includes a zipper for easy maintenance.
8. Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications, and other pertinent information.

D. DESIGN PARAMETERS:
1. Textile air diffusers shall be designed from 0.25" water gage minimum to 3.1" maximum, with 0.5" as the standard.
2. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).
3. System overall design; diameter, length, airflow, operating static pressure, and dispersion shall be designed or approved by the manufacturer.
4. Do not use textile diffusers in concealed locations.
5. Use textile air dispersion systems only for positive pressure air distribution components of the mechanical ventilation system.

PART 3 INSTALLATION

3.01 INSTALLATION OF TEXTILE AIR DISPERSION SYSTEM:

A. Install the chosen suspension system per the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with the product.

3.02 CLEANING AND PROTECTION:

A. Clean air handling unit and ductwork before the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substances which may cause corrosive deterioration of facing.

B. Temporary Closure: At ends of ducts that are not connected to equipment or distribution devices at the time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.

C. If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturer's standard terms of laundry.

END OF SECTION

SECTION 23 3813
COMMERCIAL KITCHEN VENTILATION SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:
   1. Furnish and install compensating wall canopy kitchen ventilators, exhaust fan, and make-up air unit as specified. Refer to kitchen ventilation system drawings included in mechanical contract drawings.

B. Substitutions:
   1. Products specified herein establish a quality standard for comparison by manufacturers of similar products. Products of other manufacturers may be substituted for those specified hereon on an "Approved Equal" basis. DO NOT propose the substitution of products that do not meet or exceed the quality standards established by the specified product. Products proposed as equivalent MUST be submitted through the General Contractor for review by the Architect after the Construction Contract is awarded. DO NOT request approval of products before the awarding of the Contract.
   2. Supporting technical data, samples, published specifications and the like must be submitted for comparison.
   3. The contractor shall warrant that proposed substitutions, if accepted, will provide performance equivalent to the materials specified here.

1.02 QUALITY ASSURANCE

A. Use personnel skilled in work required, completely familiar with the manufacturer's recommended methods of installation, and thoroughly familiar with the requirements of this work.

1.03 PRODUCT HANDLING

A. Protection: Protect equipment before, during, and after installation. Protect installed work and materials of other trades.

B. Replacements: In event of damage, immediately make repairs and replacements necessary at the Contractor's expense.

1.04 GUARANTEE

A. Equipment Subcontractor: Guarantee equipment item installed free of defects in materials and workmanship for one year from date of substantial completion.

1.05 RELATED WORK BY OTHER SUBCONTRACTORS

A. Before submitting a quotation for work under this Section, examine Contract Drawings and Project Manual, or otherwise determine the extent of related work such as carpentry, mechanical and electrical roughing-in and connections performed by other subcontractors. Provide equipment installed and connected under Contract between Owner and General Contractor, complete and ready for use. No extra payments made

PART 2 PRODUCTS

2.01 BAFFLE FILTER CANOPY HOOD

A. Provide Exhaust Hood as shown on plans and per this specification.

B. Kitchen Ventilation hood(s) shall be of the Type I, exhaust only wall canopy suitable for all types of cooking applications. The hood(s) shall be U.L. 710 Listed without a fire damper (with

optional) for 400 °F, 600 °F, or 700 °F rated cooking appliances. Please visit www.ul.com for U.L. 710 listing for performance and size options. Make-up air shall be independently provided.

C. The hood(s) exterior shall be constructed of a minimum of 18-gauge 400 series stainless steel (300 series optional). The hood(s) shall be constructed using the standing seam method for optimum strength and with a Performance Enhancing Lip (PEL) to improve capture efficiency by turning air back into the hood. An integral 3-inch air space is provided to meet NFPA® 96 clearance requirements against limited combustible walls. Integral 3-inch air space may be omitted for non-combustible construction. All seams, joints, and penetrations of the hood enclosure shall be welded and/or liquid-tight. Lighter material gauges, alternate material types, and finishes are not acceptable. All unexposed interior surfaces shall be constructed of minimum 18-gauge corrosion-resistant steel including but not limited to ducts, plenum, and brackets.

D. The hood(s) shall include a filter housing constructed of the same material as the hood. The filters shall be stainless steel baffle type (non-stick coating optional), U.L. 1046 Classified, and insufficient number and sizes to ensure optimum performance. The filter housing shall terminate in a pitched, full-length grease trough which shall drain into a removable grease container. These filters shall have a grease removal efficiency of 28% at 8 microns (16% from 3-10 microns) and a static pressure drop of 0.5-0.6 in WC.

E. Vapor proof, U.L. Listed incandescent (recessed, fluorescent, and LED optional, restrictions apply) light fixtures shall be pre-wired to a junction box located at the top of the hood for field connection. Wiring shall conform to the requirements of the NFPA® 70

F. The canopy hood(s) shall be built per the NFPA® 96, IMC, UMC, and bear the NSF Seal of Approval. The hood manufacturer shall provide, on request, the necessary data that confirms compliance with the code authorities listed above.

G. Refer to Drawings for Hood details.

2.02 FIRE SYSTEM #1 – FIRE SUPPRESSION

A. ANSUL-3.0/3.0/3.0 Ansul 9-gallon, UL-300 Fire System in Utility Cabinet (includes pre-piped hood(s) with detection, tank(s), release mechanism, micro-switches and pull station). Includes piping for hoods: 1 & 2, Permit, and Test.

2.03 BELT DRIVE ROOF UPBLAST CENTRIFUGAL EXHAUST FANS

A. General Description:
   1. Discharge air up and away from the mounting surface.
   2. The up-blast fan shall be for roof-mounted applications.
   3. Performance capabilities up to 30,000 cubic feet per minute (cfm) and static pressure to 5 inches of water gauge.
   4. Fans are available in fourteen sizes with nominal wheel diameters ranging from 9 inches through 48 inches (098 - 480-unit sizes).
   5. The maximum continuous operating temperature is 400 °F (204.4 °C).
   6 Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel:
   1. Material type: aluminum non-overloading, backward inclined centrifugal
   2. Statically and dynamically balanced per AMCA Standard 204-05
   3. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency

C. Motors:
   1. Motor enclosures: Open drip-roof

2. Motors are heavy-duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.
3. Mounted on vibration isolators, out of the airstream
4. For motor cooling, there shall be fresh air drawn into the motor compartment through an area free of discharge contaminants.
5. Accessible for maintenance

D. Shafts and Bearings:
1. Fan shaft shall be ground and polished solid steel with an anti-corrosive coating
2. Permanently sealed bearings or pillow block ball bearings
3. Bearing shall be selected for a minimum L10 life over 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed
4. Bearings are 100 percent factory tested
5. Fan Shaft first critical speed is at least 25 percent over maximum operating speed

E. Housing:
1. Constructed of heavy gauge aluminum includes exterior housing, curb cap, wind-band, and motor compartment housing. Galvanized material is not acceptable.
2. Housing shall have a rigid internal support structure.
3. Wind-band to be one piece uniquely spun aluminum construction and maintain original material thickness throughout the housing.
4. Wind-band to include an integral rolled bead for strength.
5. Curb cap base to be fully welded to wind-band to ensure a leak-proof construction. Tack welding, bolting, and caulking are not acceptable.
6. Curb cap to have integral deep spun inlet venturi and pre-punched mounting holes to ensure correct attachment to curb.
7. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.
8. Breather tube shall be 10 square inches in size for fresh air motor cooling, and designed to allow wiring to be run through it.

F. Vibration Isolation:
1. Double studded or pedestal style true isolators
2. No metal-to-metal contact
3. Sized to match the weight of each fan

G. Disconnect Switches:
1. NEMA rated:1
2. Positive electrical shut-off
3. Wired from fan motor to junction box installed within the motor compartment

H. Drive Assembly
1. Belts, pulleys, and keys oversized for a minimum of 150 percent of the driven horsepower
2. Belts: Static-free and oil resistant
3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts
4. The motor pulley shall be adjustable for final system balancing
5. Readily accessible for maintenance

I. Drain Trough:
1. Allows for one-point drainage of water, grease, and other residues

J. Refer to Drawings for Fan details.

2.05 PACKAGED MAKE-UP AIR UNIT WITH DIRECT FIRED FURNACE

A. MANUFACTURED UNITS
1. Unit with Integral Heating shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake weather-hood with aluminum mesh filter motorized intake

damper, filter assembly for intake air, supply air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

B. CABINET
   1. Materials: Formed single-wall metal cabinet fabricated to permit access to internal components for maintenance. The underside of the unit shall have formed metal panels covering base panel insulation.
      a. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish.)
      b. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum14 gauge galvanized (G90) steel.
   2. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
      a. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
         1) Thickness: 1 inch (25 mm)
         2) Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50 when tested per ASTM C 411.
         3) Insulation, covered on one surface with integral aluminum foil. Full interior coverage of the entire cabinet to include walls and roof of the unit shall be semi-rigid type and installed between inner and outer shells of all cabinet exterior components when double walls are specified.
   3. Access panels: The unit shall be equipped with removable access panels to provide easy access to all major components. Access panels shall be fabricated of 18-gauge galvanized G90 steel. Removable access panels shall incorporate a formed drip edge.
   4. Supply Air blower assembly: Blower assembly consists of an electric motor as specified by A/E and a belt is driven, double-width, and double inlet forward curve blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on [minimum 1.125-inch-thick neoprene vibration isolators]
   5. Control center/connections: unit shall have an electrical control center where all high and low voltage connections are made. The Control center shall be constructed to permit single-point high voltage power supply connections.
   6. Direct Gas-Fired Furnace:
      a. Shall be factory assembled piped and wired direct gas-fired system of 92% efficiency with a draw-through design and field adjustable burner baffles with a direct spark ignition system.
      b. Shall have a cast aluminum burner manifold and stainless-steel mixing plates. No air from the inside space shall be allowed to pass across the burner at any time. Flame rectification shall be provided by a flame rod. Burner control shall have a digital coded fault indicator capable of storing the last five faults.
      c. Shall be equipped for operation on natural gas with a maximum rated inlet gas pressure of 1/2 psi.
      d. Shall have fault sensors to provide fault conditions to an optional digital controller or building controls.
      e. Shall have temperature control provided by an electronic 25:1 turndown-ratio modulating discharge air sensor. Direct digital controller with integral discharge temperature limit using an external signal.
      f. Shall include the following safety controls:
         1) Manual Reset, High Limit Switch: Main gas valve closes if the high-limit temperature is exceeded.
         2) Dual safety shutoff valves shall be provided that do not exceed 120 VAC control signals.

3) High [and low] Gas Pressure Switch: Main gas valve closes if high [or low] pressure switch faults.
4) Minnesota code: Includes high and low gas pressure switches, hydro type gas valves, and proof of close valves.
5) FM global requirements: Include high and low gas pressure switches and visual indication gas valves.
6) [One] [Two] hydraulic proof of close valves(s) shall be included.
7) A gas vent line shall be included that vents gas from between the safety shutoff valves.
8) Visual indication: Clear visual signal demonstrating the position of the main gas safety shutoff valves.

7. Motorized dampers / Intake Air: Motorized damper of low leakage type shall be factory installed.

C. BLOWER
1. Blower section construction, Supply Air: Belt drive motor and blower shall be assembled onto a minimum 14-gauge galvanized steel platform and must have neoprene vibration isolation devices, minimum of 1 – 1/8 inches thick.
2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
3. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.
4. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft, with set screws.
5. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed, and efficiency. Ratings are to be established per AMCA 210, "Laboratory Methods of Testing Fans for Rating."

D. MOTORS
1. General: Blower motors greater than ¾ horsepower shall be "NEMA Premium™" unless otherwise indicated. Compliance with EPA, minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be the heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase, and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed, and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.
2. Motors shall 3 phase 460 volt

E. UNIT CONTROLS
1. The unit shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS)
2. Remote Interface: The contractor shall provide and install a Remote Interface that functions as a remote indicator of owner-selected operating parameters and also permits remote inputting of new operating parameters.

F. FILTERS
1. The unit shall have 2" thick permanent metal filters located in the outdoor air intake and shall be accessible from the exterior of the unit.

G. START-UP SERVICE
1. Engage a factory-authorized service representative to perform startup service. The clean entire unit, comb coil fins as necessary and install clean filters. Verify water source for compliance with the manufacturer's requirements for flow and temperature. Measure and

record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

H. DEMONSTRATION AND TRAINING
   1. Engage a factory-authorized service representative to train the owner's maintenance personnel to adjust, operate, and maintain the entire unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

I. Refer to Drawings for Mau details

2.06 ELECTRICAL SYSTEM #1 - ELECTRICAL

A. DCV-2111 Demand Control Ventilation, w/ control for 2 Exhaust Fans, 1 Supply Fan, Exhaust on in Fire, Lights out in Fire, Fans modulate based on duct temperature. INVERTER DUTY THREE PHASE MOTOR REQUIRED! Room temperature sensor shipped loose for field installation. Verify distance between VFD and Motor; additional cost could apply if the distance exceeds 50 feet. Includes 2 Duct-Thermostat kits.
   1. Thermistor CABLE - 18/2 AWG GREEN WHITE, plenum rated. USED for thermistor duct stat. Per Foot Price.
   2. Digital Prewire Lighting Relay Kit. Includes hood lighting relay & terminal blocks. Allows for up to 1400W of lighting each.
   3. CASLink Building Monitoring system communications module. Includes monitoring provisions for the CORE interlock fire network and hood control network. Requires an internet connection.
   4. ESV112N02YXB571 - Variable Frequency Drive - 1-1/2 HP Max., 200/240 V, Single or Three Phase Input, 6.0 A Max., NEMA 1 Enclosure, with 2RJ-45 FOR MODBUS
   5. ESV371N02YXB571 - Variable Frequency Drive - 1/2 HP Max., 200/240 V, Single or Three Phase Input, 2.4 A Max., NEMA 1 Enclosure, with 2RJ-45 FOR MODBUS
   6. ESV112N02YXB571 - Variable Frequency Drive - 1-1/2 HP Max., 200/240 V, Single or Three Phase Input, 6.0 A Max., NEMA 1 Enclosure, with 2RJ-45 FOR MODBUS

B. The Demand Control Ventilation System (DCV) is designed to automatically reduce exhaust and supply airflow quantities while ensuring hood performance is maintained. The DCV uses Variable Frequency Drives (VFD) and temperature sensors in the exhaust ducts to modulate the fan's speed during cooking operation and maximize energy savings. The LCD screen interface provides fan(s) control, system configuration, and diagnostic information.

C. The control enclosure will be NEMA 1 rated and listed for installation inside of the exhaust hood utility cabinet. Control enclosure may be constructed of stainless steel or painted steel. The smart controller will constantly monitor the exhaust air temperature through the riser mounted temperature sensor and modulate the fan speeds accordingly. A room-temperature sensor will also be provided for field installation in the kitchen space to start the fan(s) based on the fixed temperature differential between the room and the exhaust air in the duct rather than fixed set-points.

D. The panels include color-coded wiring with as-built wiring diagrams and spare terminals controlled by the fire system micro switch. The panel is factory pre-wired to shut supply fans down in a fire condition. Options to turn ON the exhaust fans or turn off the hood lights in a fire condition will be configurable through the smart controller, but only through a password-protected menu to prevent any changes after a fire inspection has been performed.

2.07 DOUBLE WALL GREASE EXHAUST DUCT

A. Furnish double-wall, factory-built grease duct for use with Type I kitchen hoods, which conforms to the requirements of NFPA-96. Products shall be ETL listed to UL-1978 and UL-2221 for

venting air and grease vapors from a commercial cooking operation. Models DW-2R, 3R, and 3Z are used for grease duct applications when installed per these instructions and National Fire Protection Association "NFPA 96"; Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. Double-wall grease ducts are listed for a continuous internal temperature of 500 °F and intermittent temperatures of 2000 °F.

B. The duct sections shall be constructed of an inner duct wall and an outer wall with insulation in between. The inner duct wall shall be constructed of .036 inch thick, 430 types stainless steel and be available in diameters 8" through 24". The outer wall shall be constructed of stainless steel at a minimum of .024-inch thickness. The duct, based on the model number, shall include layers of Super Wool 607 Plus insulation between the inner and outer walls. Grease duct joints shall be held together utilizing formed V clamps and sealed with 3M Fire Barrier 2000+. The duct wall assembly shall be tested and listed at ¾" or zero-inch clearance, according to classifications.

C. Model DW-2R is classified under UL2221 (Test of Fire Resistive Duct Enclosure Assemblies) as an alternate to 2-Hr. fire-resistive shaft enclosures with a reduced clearance to combustibles (sizes 8" to 16" diameter). Model 2R is listed per the requirements for duct enclosure Condition B.

2.08 FACTORY SERVICES - SERVICE DESIGN VERIFICATION

A. Manufacturer to perform a system design verification once all equipment has had a complete start-up per the OIM. Third-party, independent, service-contractor, not acceptable.

B. During the SDV, the service tech will address any discrepancies that are of the fault and coordinate with the general contractor to correct and resolve and issues.

C. Field Service Technician is responsible for one trip to the site to ensure the above equipment is operating within design specifications. All equipment must be operational. Fire suppression systems should be hooked-up and armed. Additional trips will result in charges to be covered by others.

2.09 APPROVED MANUFACTURERS

A. Greenheck/Accurex

B. Captive-Aire Systems.

C. Architect Approved.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment specified in strict accordance with manufacturer's directions, ready for use and operation.

B. Equipment Subcontractor:
   1. Clean up debris made by his workmen immediately upon completion of installation and remove the same from premises. Deliver equipment to the job site in a clean condition. Clean equipment just before the Owner's use, free from dirt and dust accrued from building conditions.
   2. After utility connections to equipment are made, adjust equipment, conduct final tests, demonstrate, operate, and instruct the Owner incorrect operation, maintenance, cleaning, upkeep, and adjustments to equipment.

C. Ensure kitchen hoods are braced to meet seismic requirements.

END OF SECTION

SECTION 23 4000
HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ducted Filter Housings.
B. Polarized Media Air Cleaner

1.02 RELATED SECTIONS

A. Section 23 0500 – Common Work Results for Heating, Ventilating, and Air Conditioning System.

B. Section 23 0529 – Hangers and Supports for HVAC Piping and Equipment.

C. Section 23 0713 – Duct Insulation.

D. Section 23 3100 – HVAC Ducts and Casings.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's specifications on manufactured products, used for work of this section.

B. Submit record drawings of installed filter housings, including number and sizes of filters required.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect filter housings, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering filter housings.

B. Store products inside and protect from weather.

PART 2 PRODUCTS

2.01 DUCTED FILTER HOUSING

A. General
1. Filter housing shall be constructed of minimum 22-gauge galvanized steel.
2. Frame shall be gasketed for connection to furnace or air handling units.
3. Frame shall include a gasketed, hinged access door with fastening device.
4. Filter housing shall be formed with airtight seams.
5. Filter housing to have channels to hold 1" or 2" filters in place.
6. Filter housings to be installed in attic spaces or crawl spaces must be insulated with 1" liner or approved equal.

2.02 POLARIZED MEDIA AIR CLEANTER

A. General: The air cleaner shall be a one-inch (nominal) electronically enhanced polarized media air cleaner.

C. Pre-filters: The pre-filters shall be 1" MERV disposable filters.

C. Non-Ionizing, polarized media electronic air cleaners:

1. Certifications: The air cleaner shall be tested and meet CSA Standard C22.2 No. 187-M19986 and UL Standard 867 for electrostatic air cleaners.
2. Operation: The air cleaner shall have an active electrostatic field that polarizes a dielectric media. It shall not ionize airborne particles or produce ozone.
3. Performance: The air cleaner shall be able to remove 97% of the airborne particulates 0.3µm and greater in a re-circulating system. Pressure drop across the air cleaner will be no more than 0.2"w.g. @ 300fpm. There shall be documented field data showing a greater than 50% reduction in ambient TVOC levels.
4. Construction: The construction of the air cleaner frame and screens shall be aluminum and galvanized steel. The electronic power supply (power head) shall be mounted in a channel on the frame of the air cleaner. Glass fiber media pads shall be placed between the outside grounded frame/screens. The power head shall impart a high DC voltage to the center conductive mesh of the center screen. The air cleaner frames shall be hinged so as to allow easy access to the media pad for replacement. Tandems Only - Each air cleaner shall be able to be connected both mechanically and electrically to the adjacent air cleaner. The frames of each air cleaner in the row will be latched together, so that all may be removed together. Neoprene foam strips will be used on the mating faces of the air cleaners in a row to block the flow of air between air cleaners.
5. Electronics: The power supply shall be capable of converting 24VAC to 7 kV (DC) and draw no more than two watts of power. The power supply shall be insulated from the air cleaner frame and it shall transmit the 7 kV (DC) to the center screen of the media pad through a titanium filament. Each air cleaner shall have a "Power On" lamp and be equipped with a high-voltage resistor to de-energize the air cleaner when the power is shut off. Tandems Only - Each power supply shall have an input and an output so that the power supply of each air cleaner may plug into the next. The power supplies will be connected in parallel so that if one fails; it will have no effect on the other power supplies in the row.
6. Power Supply: The 24VAC power supply must be a UL or CSA certified transformer, class "2" type, which shall permit one side of the secondary output (24V) to be attached to electrical ground.
7. Filter Media: Replaceable filter media shall be individual, disposable glass fiber "pillows", which shall consist of two ply of fiber glass with a conductive center screen of activated carbon mesh. This center screen shall be permanently enclosed between the two pieces of fiberglass and shall be disposed of when the media pad is changed. The glass fiber media must be fabricated from a constant filament so that any shed fibers are not respirable. The glass fiber must have a minimum of a class "2" fire rating.

D. Reduced Outside Ventilation Air (Optional): The system shall be designed to remove particulates and contaminants and meet ventilation rate requirements using the ASHRAE Standard 62.1 Indoor Air Quality Procedure.

E. Alternates: Any alternately specified system shall have demonstrated the ability to remove particulates and contaminants and meet ventilation rate requirements using the ASHRAE Standard 62.1 Indoor Air Quality Procedure in at least three similar installations.
1. Test Reports: Alternately specified air cleaners shall be required to conduct air quality tests before and after the installation to demonstrate that indoor air quality is at least as good as it would have been had outside air been brought in at ventilation rates using the ASHRAE Standard 62.1 Ventilation Rate Procedure.

F. Warranty: The air cleaner shall carry a written Five (5) Year Limited Warranty on parts. The warranty shall provide that a replacement will be furnished at no charge for any part of the product which fails in normal use and service during the warranty period and shall commence on the date of installation.

PART 3 EXECUTION

3.01 LOW PRESSURE DUCTWORK

A. INSTALLATION OF FILTER HOUSINGS
   1. Coordinate installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of system.

B. CLEANING AND PROTECTION
   1. Clean internally, as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal.
   2. Temporary Closure: At ends which are not connected to ductwork at time of installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

C. BALANCING
   1. Seal any leaks in ductwork that become apparent in balancing process.

3.02 AIR CLEANING DEVICE INSTALLATION

A. Provide low voltage power wiring. Field connect wiring to low voltage terminal on furnace control board (verify) or provide plug in 110 to 24-volt transformer. Verify with manufacturer's installation instructions.

B. Install air cleaner into the filter rack and connect the power cord.

C. Coordinate air cleaner size with filter rack provided for each unit.

END OF SECTION

SECTION 23 5400
HIGH-EFFICIENCY GAS-FIRED FURNACES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Gas furnaces and encased D/X cooling coil.

1.02 RELATED WORK

A. Section 23 0548 – Vibration and Seismic Controls for HVAC

B. Section 23 0923 – Automatic Temperature Controls.

C. Section 23 2300 – Refrigerant and Condensate Piping.

D. Section 23 3100 – HVAC Ducts and Casings.

1.03 REFERENCES

A. ANSI/UL 883 - Safety Standards for Fan Coil Units and Room Fan Heater Units.

B. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

C. ANSI/UL 465/559 - Central Cooling Air Conditioners and Heat Pumps.

1.04 QUALITY ASSURANCE

A. Air Handling Units: Product of manufacturer regularly engaged in the production of components who issues complete catalog data on total product.

1.05 SUBMITTALS

A. Submit drawings indicating assembly, unit dimensions and weights, required clearances, construction details, and field connection details.

B. Submit product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and finishes of materials.

C. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature for start-up instructions, installation instructions, and maintenance procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with the manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Store in a clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test-run under observation.

1.09 WARRANTY

A. Provide the entire unit, excluding refrigerant, 12-month parts, and labor warranty from date of shipment not to exceed 18 months from date of shipment.

B. Heat exchanger to have a 10-year non-prorated manufacturer's parts warranty.

PART 2 PRODUCTS

2.01 SUMMARY

A. The contractor shall furnish and install condensing furnaces as shown as scheduled on the contract documents. The units shall be installed per this specification and perform at the specified conditions as scheduled.

B. APPROVED MANUFACTURERS
   1. Trane
   2. Carrier
   3. Lennox
   4. Architect Approved

2.02 GENERAL

A. Unit Description:
   1. 96% residential gas furnace CSA certified
   2. 4-way multi-poise design
   3. Two stages of operation to save energy and maintain optimal comfort level.
   4. Variable speed blower motor technology provides ultimate humidity control, quieter sound levels, and year-round energy savings.
   5. Diagnostics 7-Segment LED all units
   6. Ignition System – DSI for reliability and longevity
   7. Water Management System with patented Blocked Drain Sensor
   8. Heat exchanger is removable for improved serviceability. Aluminized steel primary and stainless-steel secondary construction provide maximum corrosion resistance and thermal fatigue reliability.
   9. Low profile "34 inch" cabinet ideal for space constrained installations.
   10. Blower Shelf design – serviceable in all furnace orientations
   11. Pre marked hoses – insures proper system drainage
   12. Vent with 2" or 3" PVC
   13. Replaceable Collector box
   14. Hemmed edges on cabinet and doors
   15. Quarter turn fasteners for tool less access
   16. Integrated control boards feature dip switches for easy system set up
   17. Self-priming condensate trap
   18. Solid bottom included
   19. Compatible with single or two stage thermostats. For optimal performance a two stage thermostat is recommended.

B. Casing and trim pieces shall be fabricated from heavy gauge cold-rolled steel and finished on all four sides with baked enamel finish.
   1. The heat exchanger section shall be lined with foil-faced fiberglass insulation.
   2. The blower access door shall be hinged and accessible with the use of door latches. The door shall be insulated and gasketed to reduce sound transmission.

C. Heat Exchangers shall consist of sections not lighter than 20-gauge. Heat exchanger shall be 100% welded. Material shall be aluminized steel. The secondary heat exchanger shall be 29-4C stainless steel.

D. Draft Diverter:
   1. Draft Diverter shall be no lighter than 20-gauge material.

2. Draft Diverter shall be corrosion-resistant aluminized steel.

E. Duct Discharge flange shall be provided for ductwork.

F. Burner and burner controls:
   1. Gas Burner shall be multi-port in-shot type.
   2. Gas Burner Safety Controls: The sensor prevents the opening of the gas valve until the pilot flame is proven and stops gas flow on ignition failure.
   3. High Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on high bonnet temperature and re-energizes when the temperature drops to lower value.
   4. Units shall be provided with a 24-volt combination automatic gas valve, including main operating valve and pilot safety shutoff, pressure regulator, manual main and pilot shutoff valve, and adjustable pilot valve. Gas Valve shall be suitable to a maximum inlet pressure of 0.5 psi (14-inch W.C.) on natural gas.
   5. The unit shall be suitable for gas and have a two-stage gas control and Silicon Nitride igniter with adaptive heat up.

G. CONTROLS:
   1. A factory-installed junction box shall be provided for all power connections. A 24-volt transformer, high limit, and a fan time delay relay shall be provided.
   2. Fan Control: A fan time delay shall be provided and shall be controlled by a low voltage thermostat.
   3. 24 Volt output for O.S.A. damper control.

H. Operating Controls:
   1. Room Thermostat: Programmable, low voltage, 2-stage to control burner operation, to maintain the temperature setting. Include fan control switch auto-on and system off auto.
   2. Provide universal guard for room thermostat.

I. Condensate Drain:
   1. A built-in trap shall be provided that can drain from either side when the furnace is installed up-flow.
   2. Venting through the wall must maintain 1/4 in. per foot pitched upward to ensure that condensate drains back to the furnace. Pitch is not necessary for inlet combustion air.

J. Exhaust Flue:
   1. Piping of exhaust shall be sealed CPVC with a stainless-steel vent.
   2. Any fittings passing through an unheated space shall be insulated.
   3. Straps or other support shall be in minimum intervals of 3 ft.
   4. An upward pitch of 1/4 in. per foot shall be maintained for all vent piping.

K. DX Cooling Coils:
   1. Coils shall consist of copper tubes with ripple-edge aluminum fins bonded to the tubes by mechanical expansion. Suction and liquid line connections or supply and discharge connections shall be made on the same side of the coil.
   2. Direct-expansion coils shall feature factory-installed thermostatic expansion valves (TXVs) for refrigerant control. The TXVs shall be capable of external adjustment. Direct-expansion heat pump coils shall have a factory-installed bypass line and check valve assembly around the TXVs to allow liquid flow from the coil to the outdoor unit during the heating mode. Coil tubing shall be internally rifled to maximize heat transfer.
   3. Coils are to be cased with insulated with foil backed insulation.
   4. Coil width to match furnace width.

L. Accessories:
   1. Provide a concentric vent kit for flue gases and combustion air. The kit shall be appropriate for either sidewall or vertical venting.
   2. Provide external 1" filter rack with hinged door and thumbscrew for easy filter access.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install per manufacturer's instructions.

B. Install the unit on vibration isolators, as shown on the contract drawings.

C. Properly trap the condensate drain pan for drainage. For horizontal applications, provide an auxiliary drain pan with drain piped to the floor drain.

D. Connect Furnace Drain to condensate drainpipe.

E. Install the cooling coil.

F. Install external filter rack.

G. Install unit identification tag.

END OF SECTION

SECTION 23 6213
AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-to-air outdoor condensing unit.

B. Charge of refrigerant and oil.

C. Controls and control connections.

D. Refrigerant piping connections.

E. Motor starters.

F. Electrical power connections.

1.02 RELATED SECTIONS

A. Section 23 0548 – Vibration and Seismic Controls for HVAC Systems.

B. Section 23 0923 – Automatic Temperature Controls.

C. Section 23 3100 – HVAC Ducts and Casings.

1.03 REFERENCES

A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

B. ANSI/ASHRAE 90.1 - Energy Conservation in New Building Design.

C. ANSI/UL 303 - Refrigeration and Air-Conditioning Condensing, and Air-Source Heat Pump Equipment.

D. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

E. ARI 270 - Sound Rating of Outdoor Unitary Equipment.

F. ASHRAE 14 - Methods of Testing for Rating Positive Displacement Condensing Units.

G. ANSI/UL 465/559 - Central Cooling Air Conditioners and Heat Pumps

1.04 SUBMITTALS

A. Submit drawings indicating components, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for a complete system.

B. Submit product data indicating rated capacities, weight specialties and accessories, electrical nameplate data, and wiring diagrams.

C. Submit design data indicating pipe and equipment sizing.

D. Submit manufacturer's installation instructions.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, start-up instructions, installation instructions, and maintenance procedures.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with the manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on-site from physical damage. Protect coils.

1.07 WARRANTY

A. Provide five (5) year parts and replacement warranty on the compressors and heat exchangers. Also, the entire unit, excluding refrigerant, will have 12-month parts and labor warranty from the date of substantial Completion.

B. The contractor shall warranty all materials and workmanship to be free from defects for one (1) year from the date of substantial completion.

PART 2 PRODUCTS

2.01 SUMMARY

A. The contractor shall furnish and install air-to-air outdoor condensing units as shown as scheduled on the contract documents. The units shall be installed per this specification and perform at the specified conditions as scheduled.

B. APPROVED MANUFACTURERS
   1. Trane
   2. Carrier
   3. Lennox
   4. Architect Approved

2.02 GENERAL UNIT DESCRIPTION

A. Provide self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of a cabinet, compressors, condensing coil and fans, integral sub-cooling circuits, filter driers, and controls.

B. Construction and Ratings: Per ARI 210/240, and ANSI/UL 303 and ANSI/UL 465/559. Testing shall be per ASHRAE 14.

C. Performance Ratings: Energy Efficiency Rating (EER) not less than prescribed by ANSI/ASHRAE 90A.

2.03 CASING

A. House components in 18-gauge zinc-coated galvanized steel frame and panels with weather-resistant, baked enamel finish. The unit's surface shall be tested 500 hours in the salt spray test.

B. Mount controls in the weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.04 CONDENSER COILS

A. Coils: Continuous aluminum fins bonded to seamless 3/8" aluminum tubing. Provide a sub-cooling circuit(s). Factory leak test underwater to 450 psig and vacuum dehydrate. Seal withholding charge of refrigerant.

B. Coil Guard: metal louvered panels or hail guards.

2.05 FANS AND MOTORS

A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.

B. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor, or 3 phases, with permanently lubricated ball bearings or sleeve bearing and built-in current and thermal overload protection.

2.06 COMPRESSORS

A. Provide hermetic reciprocating compressor with heat-treated forged steel or cast-iron shafts, aluminum alloy connecting rods, automotive-type pistons, rings to prevent gas leakage, suction and discharge valves, crankcase heater, and centrifugal oil pump. Internally isolate hermetic units on springs. Provide suction gas-cooled motor with over-temperature and current protection. Provide external high and low-pressure cutout devices.

B. Provide each unit with one refrigerant circuit factory supplied with filter drier, suction, and liquid line service valves, and piped.

2.07 CONTROLS

A. Provide factory wired condensing units with 24-volt control circuit with internal fusing and control transformers, contactor pressure lugs, and/or terminal block for power wiring. Contractor to provide field-installed unit mounted disconnect switch. Units shall have single-point power connections.

B. Provide the following optional operating controls:
   1. Provide either a five or seven-minute off timer preventing the compressor from short cycling.
   2. Provide controls to permit operation down to 30 °F outdoor ambient temperature.

2.08 MISCELLANEOUS FEATURES

A. Neoprene Isolators: Provide field-installed rubber- in-shear isolators.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install per manufacturer's instructions.

B. Provide for connection to electrical service.

C. Install units on vibration isolation.

D. Install units on the roof support structure as indicated.

E. Provide a connection to the refrigeration piping system and evaporators.

F. Install thermostat wire in conduit from exterior wall to condensing unit. Route with refrigerant piping.

3.02 MANUFACTURER'S FIELD SERVICES

A. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

END OF SECTION

SECTION 23 7415
PACKAGED AIR CONDITIONING UNITS

PART 1 GENERAL

1.01 REFERENCES

A. UL 60335-2-40 - Standard for Safety, Household and Similar Electrical Appliances - Safety - Part 2-40.

B. AHRI 210 / 240 - Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment

C. AHRI 340 / 360 - Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat pump Equipment

D. ASHRAE 90.1 - Energy Standard for New Buildings Except Low-Rise Residential Buildings

E. California Administrative Code - Title 24

F. AHRI 270 or 370 Sound Rating of Outdoor Refrigeration and Air Conditioning Equipment, as applicable.

G. Gas-fired heaters shall comply with ANSI Z21.47 and 10 CFR Part 431 for Commercial Warm Air furnaces.

1.02 SUBMITTALS

A. Submit drawings indicating components, dimensions, weights and loadings, required clearances, and location and size of field connections.

B. Submit product data indicating rated capacities, weights, accessories, service clearances and electrical requirements.

C. Submit manufacturer's installation instructions.

1.03 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, start-up and operating instructions, installation instructions, and maintenance procedures.

1.04 HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units from physical damage. Leave factory shipping covers in place until installation.

1.05 WARRANTY

A. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first (ALL EQUIPMENT).

1.06 MAINTENANCE SERVICE

A. All work on units shall be accomplished by OEM factory trained and authorized servicing technicians.

1.07 SUMMARY

A. The contractor shall furnish and install packaged rooftop air conditioning unit(s) as shown and as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the conditions specified, scheduled or as shown on the contract drawings.

PART 2 PRODUCTS – GENERAL

2.01 MANUFACTURERS

A. Approved Manufacturers
   1. Trane Precedent
   2. Carrier
   3. Lennox
   4. Architect Approved

2.02 CASING

A. Unit casing shall be zinc coated, heavy gauge, galvanized steel.

B. Weather resistant painted metal with galvanized substrate.

C. Meets ASTM B117, 672 hour salt spray test.

D. Removable single side maintenance access panels.

E. Exposed vertical panels and top covers in the indoor air section insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material.

F. Base pan with no penetrations within the perimeter of the curb other than the raised 1-inch downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.

G. Base of the unit insulated with 1/8-inch, foil-faced, closed-cell insulation.

H. Unit base provisions for forklift and/or crane lifting on three sides of unit.

2.03 MICROCHANNEL COILS

A. Optimal heat transfer performance due to flat, streamlined tubes with small ports, and metallurgical tube to fin bond.

B. Reduce system refrigerant charge by up to 50 precent leading for better compressor reliability.

C. All-aluminum construction minimizes galvanic corrosion.

D. Strong aluminum brazed structure provides better fin protection.

E. Flat streamlined tubes more dust resistant and easy to clean.

F. Coils leak tested at the factory to verify the pressure integrity.

2.04 FIN AND TUBE COILS (HEAT PUMP ONLY)

A. Heat pump units shall have internally finned, 5/167-inch copper tubes, mechanically bonded to a configured aluminum plate fin.

B. Assembled coil shall be factory leak tested to 600 psi.

C. Assembled unit shall be leak tested to 465 psi.

2.05 COIL GUARDS

A. Provides condenser coil protection.

B. Provide metal louvered panels or hail guards.

2.06 COMPRESSORS

A. All units have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps.

B. Suction gas-cooled motor with voltage utilization range of plus or minus 10 percent of unit nameplate voltage.

C. Internal overloads shall be standard with scroll compressors.

D. Crankcase heaters shall be standard on all compressors.

E. 3–5-ton standard efficiency units shall have 1 stage of cooling. 3-5T high efficiency units shall have 2 stages of cooling. All 6-17.5-ton unit shall have 3 stages of cooling. All 20-25-ton units shall have 4 stages of cooling.

2.07 FILTERS

A. 2-inch MERV 8

2.08 FROSTAT™

A. Frostat shall be standard on all units.

2.09 GAS HEATING SECTION

A. Gas heating section includes a tubular heat exchanger in low, medium and high heat capacities and shall be made of corrosion-resistant aluminized steel tubes and burners.

B. Burner system shall have an induced draft combustion blower.

C. Heater uses a direct spark ignition (DSI) system and a flame sensor.

D. Units are designed for use with natural gas or propane (field-installed propane conversion kit).

2.10 INDOOR FAN

A. 3-5T standard eff and 3T high efficiency units shall have direct drive forward curve fan.

B. Where 3-5T includes variable speed compressors, supply fans shall be direct drive plenum with ECM motors.

C. All other models shall have direct drive plenum fans with ECM motors. Plenum fan shall be backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor.

D. Plenum fan design – backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor.

E. Supply fan speed adjustments can be made using the unit controller or using a manufacturer supplied app. The connection between the unit control and the app shall be Bluetooth.

F. Motors are electronically protected.

2.11 POWERED OR UNPOWERED CONVENIENCE OUTLET

A. Powered GFCI, 120V/15A, 2 plug, convenience outlet or unpowered GFCI, 120V/20A, 2 plug, convenience outlet shall be available.

B. Powered outlets must include a service receptacle disconnect. This outlet shall be powered from the line side of the disconnect or circuit breaker, and will remain powered when the disconnect or circuit breaker is in the open position.

2.13 OPTIONAL THROUGH-THE-BASE ELECTRICAL WITH CIRCUIT BREAKER

A. Optional through the base electrical with circuit breaker shall include thermal magnetic, molded case, and shall be HACR labeled (Heating / Air-Conditioning / Refrigeration).

B. Circuit breaker installed within unit in water tight enclosure.

C. Wiring provided from the switch to the unit high voltage terminal block.

D. Circuit breaker will provide overcurrent protection, sized per NEC and cULus guidelines, and agency recognized by cULus.

2.14 THROUGH-THE-BASE ELECTRICAL WITH DISCONNECT SWITCH

A. Optional 3-pole, molded case, disconnect switch with provisions for through-the-base electrical connections shall be available.

B. Disconnect switch installed within unit and shall be protected from outdoor elements.

C. Wiring shall be provided from the switch to the unit high voltage terminal block.

D. Switch shall be cULus recognized.

E. Provided disconnect switch does not satisfy the need for overcurrent protection. When disconnect switch is factory provided, overcurrent protection shall be provided by others.

2.15 THROUGH-THE-BASE GAS PIPING

A. Optional through-the-base gas provisions shall be available. Piping shall include black steel manual gas shut-off valve, elbows, and union.

B. Manual shutoff valve shall have 1/8-inch NPT pressure tap.

2.16 MOTORIZED OUTSIDE AIR DAMPER

A. If optional motorized outside air damper is provided, when indoor fan starts the outdoor air dampers open to set position. The damper fully closes when the indoor fan shuts down.

2.17 LEAK DETECTION SENSORS

A. Unit shall be furnished with a leak detection system from the factory when a circuit refrigerant charge exceeds 3.91 lbs. The leak detection system shall consist of one or more refrigerant detection sensors. When the system detects a leak, the unit controller shall initiate mitigation actions.

PART 3 ACCESSORIES

3.01 ROOF MOUNTING CURB

A. Roof mounting curb shall be heavy gauge zinc coated steel with nominal two-inch by four-inch nailer setup. Supply/return air opening gasketing shall be provided. Curb shall ship knocked down for easy assembly. Channel shall be provided to allow for adjustment of return air opening location. Curb shall be manufactured to National Roofing Contractors Association guidelines.

3.02 ELECTRONIC ZONE SENSORS

A. Remote Sensor shall be available to be used for remote zone temperature sensing capabilities when zone sensors are used as Remote panels

B. Integrated Comfort System sensors shall be available with sensor only, sensor with timed override, and sensor with local temperature setpoint adjustment with timed override.

C. Humidity Sensor - Monitors the humidity levels in the space for 1) Humidification and/or 2) Modulating Hot Gas Reheat.

END OF SECTION

SECTION 23 8101
TERMINAL HEAT TRANSFER UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric Unit Heaters.

B. Electric Wall Heaters.

1.02 RELATED SECTIONS

A. Automatic Temperature Controls - Section 23 09 23.

B. Equipment Wiring Systems: Division 26.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Submit shop drawings under provisions of Section 01 and Section 23 05 00.

B. Submit manufacturer's installation instructions.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01.

B. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the site under provisions of Section 23 05 00.

B. Store and protect products under provisions of Section 23 05 00.

C. Protect units from physical damage by storing in protected areas and leaving factory covers in place.

PART 2 PRODUCTS

2.01 ELECTRIC UNIT HEATERS

A. Casing and Construction.
   1. Fabricated of die formed, heavy gauge steel and finished with two-tone, brown and beige, durable powder coated paint. Supply air is drawn through the rear heavy duty expanded steel inlet grill. Heated air is discharged through front adjustable louvers, which are spring loaded for individual adjustment. Made in U.S.A.

B. Mounting:
Heaters are standard with a three-position mounting bracket for wall, ceiling or workbench. Heaters can be mounted for horizontal or vertical discharge. Note: Minimum mounting height is 6 feet, and minimum distance from side of heater to nearest wall is 6 inches. Note: Approved for residential applications.

C. Controls:
1. The heater shall have a heavy-duty hydraulic thermostat (with a temperature range of 40 °F-110 °F) factory installed and wired. All controls and wiring shall be in a large wiring compartment with hinged door for easy access. An optional disconnect switch shall be available for field installation.

D. Thermal Overload:
1. All heaters shall be equipped with an automatic reset thermal cutout to shut down the element and motor circuits if unsafe operating temperatures are exceeded.

E. Motor:
1. Motor shall be totally enclosed, permanently lubricated, all angle industrial rated with thermal overload protection.

F. Wiring:
Wiring to terminal block adjacent to incoming knockout in accordance with NEC and local codes.

G. Element:
1. Heavy-duty block fin element design. The multiple tap electric connection design allows field conversion to eight wattage settings at 208/240-Volt single phase or 240/480 Volt, 3-phase. Units are available on special order with a specific wattage/voltage setting.

2.02 ELECTRIC WALL HEATERS

A. General:
1. Contractor shall supply and install heavy duty wall mounted forced air electric heaters of the wattage, voltage and phase as specified. The heater shall so be designed to provide an even distribution of heated air to the space to be heated by drawing return air in the peripheral area of the heater across and through the element which shall then be discharged from the center section of the heater by means of an electric motor and axial flow fan blade. Heaters shall be recessed type to extend no more than 1 1/2" from the finished wall or surface mounted to extend no more than 5 3/4" from the finished wall or semi-recessed type to extend no more than 3 1/2" from finished wall or semi-recessed type to extend no more than 2 1/2" from finished wall.

B. Enclosure:
1. Heater front shall withstand 10.8 ft. lbs. (324 poundals) impact and 400 lbs. static force applied to an 8 sq. in. area at center grille location with less than 1/16" permanent distortion. The combination return and supply grille assembly shall be constructed of 1/16" x 3/8" rounded edge horizontal steel louvers which shall be spaced for maximum opening of 1/4". Louvers shall be welded at every intersection to three evenly spaced 1/16" diameter vertical members and completely framed in a heavy gauge natural anodized Aluminum extrusion. Front assembly shall be attached to the chassis by hidden tamper-resistant (Allen-head) machine screws. All other parts shall be 16-gauge steel Zinc coated, both sides finished in a high gloss or bronze colored baked powder coat finish.

C. Motor:
1. Motor shall be a permanently lubricated unit bearing, totally enclosed shaded pole type with impedance protection.
2. Motors shall operate at no more than 1400 RPM and shall be same voltage as the heater. A protective shield shall surround the motor to separate return air from heated air.

D. Performance:
1. Heaters shall have a rating of 245 CFM at 660 F.P.M. with a maximum temperature rise of 73°F.

E. Elements:
1. Element assemblies shall consist of two or three corrosion resistant steel sheathed type elements mechanically bonded to common corrosion resistant steel fins. Each sheathed element shall consist of helically coiled Nickel Chromium alloy resistant wire completely embedded in and surrounded by Magnesium Oxide, enclosed and wedged into corrosion resistant steel sheaths. Elements shall have 2" cold conductor pins extending into the sheath and shall have a density of no more than 60 Watts per inch.

F. Thermal Overload:
1. Heaters shall be equipped with a "manual reset" thermal overload which disconnects elements and motor in the event normal operating temperatures are exceeded. For safety, if opened due to abnormal temperature, thermal overload shall remain open until manually reset. Automatic reset thermal overloads which allow the element to continue to cycle under abnormal conditions will not be accepted.

G. Approval:
1. Heaters shall be ETL Listed.

H. Circuit Breakers (3450 Series Only):
1. Heaters shall be equipped with built-in circuit breakers in order to allow the heaters to be supplied from feeder taps.
2. A separate switch providing a positive off for control circuits shall be included where required. Circuit breakers and control switches shall be arranged so that all line side conductors will be separately enclosed when heater front is removed for servicing so that no current carrying parts are accessible without the use of additional tools.

2.03 MANUFACTURERS

A. Unit Heaters:
1. Markel.
2 Q-Mark.
3. Architect Approved.

B. Wall Heaters:
1. Markel.
2. Q-Mark.
3. Architect Approved.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that required utilities are available, in a proper location, and ready for use.

3.02 INSTALLATION

A. Install per manufacturer's instructions.

B. Hang unit heaters from building structure, with pipe hangers anchored to building, not from the piping. Mount as high as possible to maintain the greatest headroom unless otherwise indicated.

C. Protect units with protective covers during the balance of construction.

3.03 CLEANING

A. Clean work under provisions Division 1.

B. After construction is completed, including painting, clean exposed surfaces of units. Vacuum the clean coils, and inside of cabinets.

C. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by the manufacturer.

END OF SECTION

SECTION 23 8126
DUCTLESS MINI-SPLITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mini-split heat pump system.

B. Mini-split heat pump system outdoor unit.

1.02 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.

B. All wiring shall be in accordance with the National Electric Code (NEC).

C. The system shall be rated in accordance with Air Conditioning Refrigeration Institute's (ARI) Standard 210/240 and bear the ARI label.

D. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.

E. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2002 and installed to resist the wind pressures on the equipment and the supports.

F. The outdoor unit will be factory charged with R-410A.

G. A holding charge of dry nitrogen shall be provided in the evaporator.

H. System efficiency shall meet or exceed 16.0 SEER and 9.2 HSPF.

1.03 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MINI-SPLIT HEAT PUMP SYSTEM, CONCEALED AND DUCTED

A. Operating Conditions
   1. The indoor unit shall be capable of the following ambient operating range.
      a) Cooling: 57°F WB to 77°F WB
      b) Heating: 59°F DB to 81°F DB

B. General
   1. Unit shall be manufactured by LG or approved manufacturer.
   2. Unit shall be factory assembled, wired, piped and run tested.
   3. Unit shall be designed to be installed for indoor application.
   4. Unit shall be designed to mount fully concealed above the finished ceiling.

5. Unit shall have opening to supply air from front horizontal and a dedicated rear horizontal return.
6. The supply air opening shall be flanged for field installed ductwork that shall not exceed the external static pressure limitation of the unit.
7. The indoor units have sound ratings no higher than 42 dB(A) as tested per ISO Standard 3745.
8. The unit shall be compatible with both standard single zone and LGRED° 24,000Btu/h and 36,000 Btu/h outdoor units in addition to Multi Zone outdoor units.
9. The unit shall only be compatible with LGRED outdoor units.

C. Casing/Panel
1. Unit case shall be manufactured using galvanized steel plate.
2. The cold surfaces of the unit shall be covered internally with a coated polystyrene insulating material.
3. The cold surfaces of the unit shall be covered externally with sheet insulation made of Ethylene Propylene Diene Monomer (M-Class) (EPDM).
4. The external insulation shall be plenum rated and conform to ASTM Standard D-1418.
5. Unit shall be provided with hanger brackets designed to support the unit weight on four corners.
6. Hanger brackets shall have pre-punched holes designed to accept field supplied, all thread rod hangers.

D. Cabinet Assembly
1. Unit shall have supply air discharge outlets horizontal and a return air inlet horizontal.
2. Unit shall be equipped with factory installed temperature thermistors for
   a) Return air
   b) Refrigerant entering coil
   c) Refrigerant leaving coil
3. Unit shall have a built-in control panel to communicate with the outdoor unit.
4. Unit shall have the following functions as standard
   a) Self-diagnostic function
   b) Auto restart function
   c) Auto changeover function
   d) Dehumidifying function
   e) Child lock function
   f) Dual thermistor control
   g) Hot Start
   h) Sleep mode
   i) External static pressure (ESP) control

E. Fan Assembly
1. The unit shall have two direct driven Sirocco fans.
2. The fan shall be made of high strength ABS GP-2200 polymeric resin.
3. The fans shall be mounted on a common shaft.
4. The fan motor shall be Brushless Digitally controlled (BLDC) with permanently lubricated and sealed ball bearings.
5. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
6. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm.
7. In cooling mode, the indoor fan shall have the following settings: Low, Med, High,

and Auto.

8. In heating mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
9. The Auto fan setting shall adjust the fan speed to most effectively achieve the set-point.
10. Each of the settings can be field adjusted from the factory setting (RPM/ESP).
    a) Unit shall have Auto ESP Control to adjust and deliver constant airflow regardless of permitted external static pressure.
11. Unit shall be designed for highspeed air volume against an external static pressure of up to 0.59 inches water gauge.

F. Filter Assembly
1. The return air inlet shall have a factory supplied removable, washable filter.
2. The filter access shall be from the rear of the unit.
3. <Optional><Return filter box with high-efficiency filter shall be field provided and installed not to exceed external static pressure limitation of the high static ducted indoor unit.>

G. Coil Assembly
1. Unit shall have a factory-built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. Unit shall have minimum of 3 rows of coils.
3. Unit shall have a factory supplied condensate drain pan below the coil.
4. Unit shall have an installed and wired condensate drain pump capable of providing minimum 27.5 inch lift from bottom surface of the unit.
5. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan.
6. Unit shall have provision of 45° flare refrigerant pipe connections.
7. The coil shall be factory pressure tested at a minimum of 551 psig.
8. All refrigerant piping from outdoor unit to indoor unit shall be field insulated.

H. Microprocessor Control
1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.
2. The unit shall be able to communicate with the outdoor unit using a field supplied minimum of 14 AWG, 4 conductor, stranded, shielded or unshielded power/communication cable. If shielded, it must be grounded to chassis at ODU only.
3. Central control shall be available through an optional control board for the outdoor unit.
4. Group control shall be available to allow multiple indoor units to operate from a single controller, or allow connection of more than one controller to an indoor unit.
5. The unit shall be able to operate with the fan turned off during system cooling thermal off.
6. The unit shall be able to operate with a continuous fan setting.
7. The unit controls shall operate the indoor unit using one of the five operating modes:
    a) Auto changeover
    b) Heating
    c) Cooling
    d) Dry
    e) Fan only

I. Electrical
1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz)
2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

J. Controls
1. The indoor unit shall use controls provided by the manufacturer to perform all functions necessary to operate the system effectively and efficiently.
2. An optional wireless handheld controller shall be available as an additional accessory for use with installed LG wired controller.
3. An optional dry contact shall be available as an additional accessory.
4. The indoor unit shall accommodate an optional Wi-Fi module as an additional accessory to allow monitoring and control through a smart device with the LG Smart ThinQ© application.

K. Warranty
1. Please refer to the respective outdoor unit for applicable warranty.

2.02 MINI-SPLIT HEAT PUMP SYSTEM (EXPOSED WALL MOUNTED EVAPORATOR)

A. Wall Mounted

B. Operating Conditions
1. The indoor unit shall be capable of the following ambient operating range.
   a) Cooling: 57°F DB to 77°F WB
   b) Heating: 59°F WB to 81°F DB

C. General
1. Unit shall be manufactured by LG.
2. Unit shall be factory assembled, wired, piped and run tested.
3. Unit shall be designed to be installed for indoor application.
4. Unit shall be attached to an installation plate/bracket that secures unit to the wall.
5. The depth of the unit shall not exceed 9 inches.

D. Casing/Panel
1. Unit case shall be manufactured of heavy-duty Acrylonitrile Butadiene Styrene (ABS) and High Impact Polystyrene (HIPS) plastic.
2. Unit case shall have a pearl white finish: Munsell 7.5BG 10/2 (RAL 9016).
3. The front surface of the unit shall have an architectural curved panel with pearl white finish and integrated digital display.

E. Cabinet Assembly
1. Unit shall have one supply air outlet and one return air inlet.
2. Unit shall be equipped with factory installed temperature thermistors for
   a) Return air
   b) Refrigerant entering coil
   c) Refrigerant leaving coil
3. Unit shall have a built-in control panel to communicate with the outdoor unit.
4. Unit shall have the following functions as standard
   a) Self-diagnostic function
   b) Auto restart function
   c) Auto operation function
   d) Auto clean function
   e) Dehumidifying function

f) Forced operation
g) Hot Start
h) Sleep mode

5. Unit shall be capable of refrigerant piping in 4 different directions.
6. Unit shall be capable of drain piping in 2 different directions.

F. Fan Assembly

1. The unit shall have a direct-drive, cross flow fan made of high strength ABS plastic.
2. The fan motor is Brushless Digitally controlled (BLDC) with permanently lubricated and sealed ball bearings.
3. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
4. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm.
5. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, Jet Cool, and Auto.
6. In heating mode, the indoor fan shall have the following settings: Low, Med, High, Jet Heat and Auto.
7. The Auto fan setting shall adjust the fan speed to most effectively achieve the set-point.
8. Unit shall have factory installed motorized louver to provide flow of air in up and down direction for uniform airflow.
9. Unit shall have factory installed motorized guide vane to control the direction of flow of air from side to side.

G. Filter Assembly

1. The return air inlet shall have a factory supplied primary removable, washable filter.
2. The unit shall be equipped with factory supplied secondary 3M Micro Dust Filter.
3. The filter access shall be from the front of the unit.

H. Coil Assembly

1. Unit shall have a factory-built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. Unit shall have minimum of 2 rows of coils.
3. Unit shall have a factory supplied condensate drain pan below the coil.
4. Unit shall be designed for gravity drain.
5. Unit shall have a factory insulated drain hose to handle condensate.
6. Unit shall have provision of 45° flare refrigerant pipe connections.
7. The coil shall be factory pressure tested at a minimum of 551 psig.
8. All refrigerant piping from outdoor unit to indoor unit shall be field insulated.

I. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.
2. The unit shall be able to communicate with the outdoor unit using a field supplied minimum of 18 AWG, 4-conductor, stranded, shielded or unshielded power/communication cable. If shielded, it must be grounded to chassis at ODU only.
3. Central control shall be available through an optional control board for the outdoor unit.
4. Group control shall be available to allow multiple indoor units to operate from a single controller, or allow connection of more than one controller to an indoor unit.
5. The unit controls shall operate the indoor unit using one of the five operating

modes:
a) Auto operation
b) Heating
c) Cooling
d) Dry
e) Fan only

J. Electrical
1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz)
2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

K. Condensate Sensor Connection
1. The unit shall include a factory installed condensate sensor connection compatible with the AquaGuard® AG-9300-LG condensate sensor.

L. Controls
1. The indoor unit shall be supplied with a wireless handheld controller.
2. An optional wired controller shall be available as an additional accessory.
3. The unit shall have built-in (factory installed) Wi-Fi to allow monitoring and control through a smart device with the LG Smart ThinQ© application.

M. Warranty
1. Please refer to the respective outdoor unit for applicable warranty.

2.03 MINI-SPLIT HEAT PUMP, OUTDOOR UNIT

A. Operating Conditions
1. The outdoor unit shall be capable of the following ambient operating range.
a) LUU240HHV
1) Cooling: 5°F DB to 118°F DB
2) Heating: -13°F WB to 64°F WB

B. General
1. Unit shall be manufactured by LG or approved manufacturer.
2. The air-conditioning system shall use R410A refrigerant.
3. Each system shall have one air source outdoor unit.
4. The refrigerant circuit shall be field piped to a single matching indoor unit to effectively and efficiently control the heating or cooling operation of the system.
5. All refrigerant piping from outdoor unit to indoor unit shall be field insulated.
6. Factory installed microprocessor controls in the outdoor unit and indoor unit shall perform functions to efficiently operate the single zone system and communicate via minimum 14 AWG, 4-conductor, stranded, shielded or unshielded power/communication cable. If shielded, it must be grounded to chassis at ODU only.
7. The outdoor unit shall be internally assembled, wired and piped from the factory.
8. The factory assembled system shall have the outdoor unit fitted with refrigerant strainer, check valves, oil separator, accumulator, 4-way reversing valve, electronic expansion valve, high side and low side refrigerant charging ports, and a service port.

C. Piping capabilities
1. The outdoor unit shall be capable of operating at an elevation of 98.4 feet above or below the indoor unit.

2. The outdoor unit shall be capable of operating with up to 164 feet of total equivalent refrigerant piping length.

D. Defrost Operations
1. The outdoor unit shall be capable of auto defrost operation to melt accumulated ice off the outdoor unit heat exchanger. The defrost cycle control shall be based on outdoor ambient temperatures and outdoor unit heat exchanger temperatures.
2. Factory installed base pan heater shall be included for outdoor units.

E. Oil Management
1. The outdoor unit shall have an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.
2. The outdoor unit shall have an oil separator to separate oil mixed with the refrigerant gas during compression and return oil to the compressor.

F. Cabinet
1. The outdoor unit cabinet shall be made of pre-coated metal (PCM).
2. The front/side panels of the outdoor unit shall be removable type for access to internal components.
3. Outdoor unit cabinet shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours.

G. Fan Assembly
1. Each 1-1/2-to-2-ton outdoor unit shall be equipped with one direct drive variable speed propeller fan with Brushless Digitally Controlled (BLDC) motor with a horizontal air discharge.
2. The fan blades shall be made of Acrylonitrile Butadiene Styrene (ABS) material.
3. The fan(s) shall be equipped with permanently lubricated bearings.
4. The fan motor(s) shall have variable speed to a maximum of 800 RPM.
5. The fan(s) shall have a raised guard to help prevent contact with moving parts.

H. Outdoor Coil
1. Variable Path Heat Exchanger
   a) The variable path heat exchanger technology shall be provided to maintain stable refrigeration cycle operation during mild weather conditions and maintain a robust hot vapor temperature system head pressure that delivers "gas-furnace leaving air temperature" from the indoor unit at sub-zero outdoor air temperature down to minus (-) 13°F.
2. The aluminum fins shall have factory applied corrosion resistant GoldFin™ material.
3. Coil coating shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours.
4. The outdoor unit coil shall be factory tested to a pressure of 600 psig.
5. The coil for each outdoor unit shall have a minimum of 14 Fins per Inch (FPI).
6. The coil for each outdoor unit shall have a 2-row heat exchanger.
7. The outdoor unit cabinet shall have a coil guard.

I. Compressor
1. The outdoor unit shall be equipped with one hermetically sealed, digitally controlled, inverter driven R1 scroll compressor.
2. The inverter driven, digitally controlled compressor shall be capable of operating in a frequency range from 10 Hz to 95 Hz (cooling), 10Hz to 130Hz (heating) with control in 1 Hz increments.
3. The compressor shall be mounted on vibration attenuating rubber grommets.

4. The compressor shall use a factory charge of Polyvinyl Ether (PVE) oil.
5. The compressor bearing(s) shall have Teflon™ coating.
6. The compressor shall be equipped with over-current protection.
7. Standard, non-inverter driven compressors shall not be permitted nor shall a c compressor without vapor injection or direct sump oil return capabilities.

J. Sound Levels
1. The outdoor unit shall have sound levels not exceeding 56 dB(A) tested in an anechoic chamber under ISO 3745 standard.
2. A field setting shall be available to program the outdoor unit to reduce sound levels at night, when desired, to a selectable level while still able to meet building load requirement. This mode is available in both cooling and heating modes.

K. Sensors
1. The outdoor unit shall have
   a) Suction temperature sensor
   b) Discharge temperature sensor
   c) High pressure sensor
   d) Low Pressure sensor
   e) Outdoor temperature sensor
   f) Outdoor unit heat exchanger temperature sensor

L. Wind Load Installations for Outdoor Units
1. Provide Florida wind Load Installation Drawings that meet the requirements of the 2017 Florida Building Code, 6th Edition and ASCE Standard 7-2010 with submittal.

M. Warranty
1. Limited Warranty Period
   a) STANDARD FIVE (5) YEAR WARRANTY FOR A QUALIFIED SYSTEM - The Part(s) of a qualified System, including the compressor, are warranted for a period (the "Standard Parts Warranty Period") ending five (5) years after the date of original installation. In absence of proof of installation, the warranty date will end five (5) years from the date of manufacture.
   b) ADDITIONAL TWO (2) YEAR COMPRESSOR PART WARRANTY - The Compressor is warranted for an additional two (2) year period after the end of the applicable Standard Part Warranty Period (the "Compressor Warranty Period").
2. Extended Warranty
   a) The Standard Warranty Period and the Compressor Warranty Period are extended to a total of ten (10) years (the "Extended Warranty Period") for qualified Systems that have been (a) installed by a party that has completed the Training Requirements, (b) installation is pursuant to LG's published instructions, and (c) product is registered within 60 days of startup at www.lg-dfs.com or www.lg-dfs-warranty.com.

N. Roof mounting curb
1. Where shown on the plans to be mounted on the roof, a curbed mounting frame will be provided. Refer to curb detail on plans.

2.04 APPROVED MANUFACTURERS

A. Mitsubishi

B. Daikin

C. LG

D. Architect Approved.

PART 3 EXECUTION

3.01 Orient unit to obtain maximum air flow to condenser coil and adequate clearance for service (refer to manufacturer's installation instructions.

3.02 Install unit level and attach to supports.

3.03 Install interconnecting refrigerant piping between outdoor unit and indoor air handler. Arrange piping to provide access for service panel removal and to avoid restricting service walk area.

3.04 Coordinate location of electrical connections with electrical contractor.

3.05 Install condensate drain piping.

3.06 Install control wiring in conduit.

3.07 Install unit identification tags.

3.08 Secure outdoor units to concrete base.

END OF SECTION

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Divisions 26 and 28 Sections, in addition to Division 1 - General Requirements.

1.02 REFERENCES

A. The following specifications and standards of issues listed below but referred to thereafter by basic designation only, form a part of these specifications:
   1. American Society for Testing Materials.
   2. American Standards Association.
   3. Americans with Disabilities Act (ADA).
   4. Arkansas Energy Code (ASHRAE 90.1).
   5. Arkansas Fire Prevention Code.
   6. Illuminating Engineering Society.
   7. Institute of Electrical and Electronic Engineers.
   8. International Building Code, 2012 Edition.
   9. Local, City and State Codes and Ordinances.
   10. National Electrical Code, 2017 Edition.
   11. National Electrical Manufacturers Association.
   12. National Electrical Safety Code, 2002 Edition.
   13. National Fire Protection Association's Recommended Practices.
   14. Occupational Safety and Health Act.
   15. Power Cable Engineers Association.
   16. Service requirements of serving utility company.
   17. Underwriter's Laboratories, Inc.

1.03 SUBMITTALS

A. Submit six (6) sets of shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. The basic information for each item of equipment to be included is as follows:
   1. Index.
   2. Installation and Operating Instructions
      a. Individual tabbed sections.
      b. Manufacturer descriptive literature.
      c. Applicable control diagrams.
      d. Composite wiring diagrams.
   3. Each submittal sheet shall be clearly marked with equipment Catalog Number and accessory items being submitted.

1.04 REGULATORY REQUIREMENTS

A. Work shall conform to all applicable codes, specifications, local ordinances, industry standards and utility company regulations.

B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor, in such cases, may at his option propose any article, approved equal to or better than that specified, as approved in writing by the Engineer.

C. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations.

D. In case of difference between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations and the contract documents, the most stringent shall govern. The Contractor shall promptly notify the Engineer in writing of any such

difference.

E. Non-Compliance: Should the contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.

F. All required fees, permits and inspections shall be obtained and paid for by the contractor under the section of the specifications for which they are required.

1.05 ELECTRICAL LICENSE REQUIREMENT

A. No person shall perform electrical work on the Contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiner's Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one-to-one ratio.

B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.

C. The Arkansas Department of Labor requires that the worker, who installs raceway for low voltage cables of temperature controls, fire alarm, telecommunications, intrusion detection, access control, public address, television distribution, etc., be paid the electrician's minimum wage rate.

1.06 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions. The Engineer/Owner reserves the right to relocate any device a maximum distance of 6'-0" at the time of installation without an extra cost being incurred.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.

1.07 CONTRACTOR REVISED DRAWINGS

A. The Contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.

B. Upon completion of the work and prior to final payment, the Contractor shall furnish to the Engineer, one set of "contractor revised" reproducibles, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the contract drawings.

1.08 GUARANTEE

A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.

B. The Contractor shall, after completion of the original test of the installation, and acceptance by the Engineer, provide any service incidental to the proper performance of the electrical systems under guarantees outlined above for a period of one (1) year.

1.09 OPERATING AND MAINTENANCE MANUALS

A. After approval of materials and equipment for use in this project, 3 copies of an Operation and Maintenance Manual shall be submitted for approval.

B. The basic information for each item of equipment to be included is as follows:
   1. Index
   2. Maintenance and operating instructions
      a. Manufacturer's descriptive literature and maintenance manuals
      b. An Approved Set of Shop drawings

c. Applicable control diagrams
d. Composite wiring diagrams as applicable showing all motor controllers, relays, etc., with interlocking provisions as built in the job, along with a written description of the control sequence if applicable.
e. Spare parts list (when parts are provided)
f. Listing of part suppliers and their addresses
g. Single line diagram of the "as built" building electrical distribution system.

C. Upon final approval, submit one (1) bound copy of the approved Operation and Maintenance Manual to the Engineer and hold two (2) copies for instruction of Owner as hereinafter specified.

1.10 CONFLICTS BETWEEN DRAWINGS AND SPECIFICATIONS

A. If a conflict between the drawings and the specifications occurs, the most stringent requirement shall apply.

PART 2 PRODUCTS

2.01 UL LISTING

A. Where the Underwriter's Laboratories have an applicable standard, the product shall be listed with UL and shall be so marked.

2.02 SUBSTITUTIONS

A. Each Section of the Project Manual, when applicable has a paragraph entitled "Manufacturers". If "Engineer Approved Equal" is not in the list of manufacturers, no substitutions will be accepted. Submit one of the manufacturers listed.

B. The Engineer does not give any prior approvals on submittals. Do not call the Engineer for prior approval.

PART 3 EXECUTION

3.01 600 VOLT INSULATION TEST

A. Prior to energizing the electrical system, the contractor shall provide insulation resistance tests for all distribution and utilization equipment. The Contractor shall provide a suitable and stable source of test power. The insulation test shall be a "megger" test at 500 volts D.C. for one-half minute. A test report shall be submitted to the Engineer. The minimum insulation resistance for No. 12 AWG conductors shall be 1,000,000 ohms and for larger conductors shall be 250,000 ohms. Conductors testing below the minimum insulation resistance shall be replaced and tested again.

3.02 CONTINUITY TEST

A. The Contractor shall perform a continuity test on the entire electrical system prior to energizing the system to insure proper cable connections.

3.03 CONNECTION TORQUE TESTS

A. All No. 1/0 AWG and larger conductors with bolted connections shall be torque tested using a torque wrench. Torque shall be to National Electrical Testing Association's (NETA) Standards.

3.04 REMOVAL OF RUBBISH

A. Contractor shall remove his rubbish from building site at intervals and shall maintain the spaces allotted him in an orderly manner. On completing his work, and prior to submission of final estimate, he shall remove all tools, appliances, material and rubbish from the grounds.

3.05 GROUND RESISTANCE MEASUREMENTS

A. Ground resistance measurements of each ground rod shall be taken and certified by the Contractor to the Engineer. No part of the electrical distribution system shall be energized prior to the resistance testing of that system's ground rods and grounding system and submission of test results to the Engineer. Test reports shall indicate the location of the ground rod and

grounding system and the resistance and the soil conditions at the time the test was performed. When the building water service is used as a ground of part of the grounding system, ground-resistance measurements shall also be made of this connection. Ground resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds. The resistance to ground shall be measured using the fall-of-potential method described in IEEE No. 142. Submit test reports with Operation and Maintenance Manuals.

3.06 MECHANICAL OPERATION TESTS

A. All electrical equipment, such as switches, circuit breakers, etc., shall be tested by operating the device to verify that the mechanical portions of the device are functioning.

3.07 ROTATIONAL TESTS

A. The Contractor shall assist Division 15 in performing rotational tests on all motors. If rotational tests determine that conductors must be transposed to change direction of rotation, the conductors shall be changed at the make-up box on the motor; or if the change is made elsewhere, then the conductor's color coding shall be changed.

3.08 INSTRUCTING OWNER'S REPRESENTATIVE

A. The Contractor shall instruct representatives of the Owner in the proper operation and maintenance of all elements of the Electrical system.

B. Contractor shall spend not less than one (1) day in such formal instruction to fully prepare the Owner's representative to operate and maintain the Electrical systems.

3.09 UL LISTINGS

A. The Contractor shall bear all responsibility for any work, which he performs, that voids any UL listings of any equipment.

3.10 OWNER OCCUPIED BUILDINGS

A. Holes cut in Owner occupied buildings shall be approved prior to any work by the structural engineer and shall be done with drills with vacuum attachments that vacuum cuttings as the drill cuts.

B. All drilling, hammering, or other loud construction activities shall be done after Owner's normal working hours.

C. Conduit cutting will be done outside.

D. Contractor shall clean work area at the end of each day.

3.11 OBJECTIONABLE NOISE AND/OR HARMONICS

A. If after installation of the electrical system, it is found that objectionable noise or harmonics exists on the electrical system, the manufacturer of the equipment which is producing the objectionable noise or harmonics shall install the proper electrical equipment to prevent the noise and/or harmonics from emitting onto the building's electrical system and shall be contained within the offending equipment.

3.12 VOLTAGE MEASUREMENTS

A. Contractor shall measure and record voltage at service equipment with as much load on the system as possible. Contractor shall measure and record phase-to-phase, phase-to-neutral, and phase-to-equipment ground voltages for each phase. Where harmonic cancellation transformers are installed, contractor shall also measure and record phase-to-phase, phase-to-neutral and phase-to-equipment ground voltages for each phase on the secondary side of the transformers. Contractor shall submit records of these voltages with the Operation and Maintenance Manuals.

3.13 REMOVAL OF PAINT AND OTHER FINISHES

A. The contractor shall remove all paint and other non-factory finishes applied inadvertently by other subcontractors to all electrical equipment.

3.14 TEMPORARY CONSTRUCTION POWER AND LIGHTING

A. The contractor shall provide all necessary temporary construction power and lighting to accomplish the work.

B. After the construction is completed, the contractor shall remove all temporary construction power and lighting.

3.15 PROJECT PHASING

A. The contractor shall become familiar with the project phasing prior to his bidding the project and shall include in his bid, the amount of money required by him to provide the necessary labor, materials, adjustments, programming, reprogramming, and accessories to provide the project in the phases shown within the general conditions of the contract documents.

END OF SECTION

SECTION 26 0501
ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 0 Specification sections, apply to work specified in this section.

1.02 REGULATORY REQUIREMENTS

A. Conform to the requirements of NFPA 70 - National Electrical Code.

1.03 DESCRIPTION OF WORK

A. The extent of general building demolition work is shown on drawings. Coordinate the required electrical work with the general demolition.

B. Demolition includes removal and disposal of demolished materials, as shown on drawings and herein specified.

C. Interior demolition includes work in crawl spaces, work above ceilings, finishes, and removal and disposal of demolished materials, as shown on drawings and herein specified.

D. The Owner shall have the option of retaining any items removed. The Contractor shall dispose of all material off site, unless directed otherwise by Owner.

1.04 JOB CONDITIONS

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.
   1. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The contractor shall visit the site and determine the actual conditions prior to bidding.

B. Partial Removal: Items of salvable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.
   1. Storage or sale of removed items on site will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

D. Protections: Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
   1. Install temporary electrical services, lighting, etc. as required by the Owner or authorities having jurisdiction.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

F. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with Owner at least 24 hours in advance.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing fire utilities, as acceptable to governing authorities.
2. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

G. If Contractor is required to disconnect utility services or other services to an occupied area the Contractor shall provide temporary or alternative services to that area.

PART 2 PRODUCTS

Not Applicable.

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove all branch and feeder conduit and wire back to panelboards.
1. Where walls, ceilings, or floors are to remain, remove all devices, and wire where indicated. Provide blank cover plate at outlet box or patch wall to match existing finish as directed by the issued documents and/or the Architect/Engineer.
2. All items shown to remain active shall be furnished with necessary accessible junction boxes and all conduit and wire as required to maintain circuit continuity.
3. All outlet boxes which must be removed due to demolition but which must remain active in order to maintain circuit continuity shall be relocated into ceilings or walls and shall be accessible.
4. All material, fixtures, and equipment to be reused shall be removed and stored on site. Before reinstallation all items are to be cleaned, tested, and prepared for re-use. Fixtures shall be re-lamped and new ballasts installed.
5. Correct existing directories of load centers, panelboards, and switchboards where circuits are removed and/or added. Corrections to existing directories of load centers and panelboards shall be neatly handwritten. Nameplates are required at switchboards.
6. Conduit in a concrete slab or that is not shown to be reused, may be abandoned provided as follows:
   a. Conduits in slab shall be cut off at top of slab.
   b. Underground conduits shall be removed to 12 inches below grade before being abandoned.
7. Fire seal all holes in fire and/or smoke walls and floors where conduits are removed.

B. Remove all accessible low-voltage cables that are not to be reused.
1. This includes data, telephone, television, audio/visual, intercom, fire alarm, security, access control, public address, and temperature control cables.
2. Fire seal holes where these cables penetrated fire and/or smoke walls and floors.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.
1. Remove and dispose of interior demolition debris only.
2. Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:
1. Transport materials removed from demolished structures and dispose of off site.

C. Store items that Owner wishes to retain as directed by the Owner.

3.03 OUTAGES

A. The Contractor shall schedule all outages with the Owner at least two weeks in advance. Owner has the right to approve or disapprove any scheduled outages. Contractor will schedule the outage at the Owner's convenience. Contractor shall pay all costs, including overtime, necessary for the outage work schedule.

B. Refrigerators and freezers shall not be turned off for more than 1 hour. If the Contractor needs more than 1 hour, he shall install a temporary feeder to the equipment and/or rent an emergency generator to power the equipment. Contractor shall pay all costs of the generator and/or temporary feeders at no additional cost to the Owner.

END OF SECTION

SECTION 26 0502
EQUIPMENT WIRING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to elevator, plumbing, appliances, and mechanical equipment specified under other sections or Owner furnished equipment.

1.02 RELATED SECTIONS

A. Section 26 0519 – Low-Voltage Electrical Power Connectors and Cable.

B. Section 26 0529 – Hangers and Supports for Electrical Systems.

C. Section 26 0533 – Raceway and Boxes for Electrical Systems.

D. Section 26 2816 - Enclosed Switches and Circuit Breakers.

E. Section 28 3100 – Fire Detection and Alarm.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NEMA WD 1 - General Purpose Wiring Devices.

C. NEMA WD 6 - Wiring Device Configurations.

D. NFPA 72 - National Fire Alarm Code.

E. UL 498 - Attachment Plugs and Receptacles.

F. UL 1010 - Receptacle Plug Combinations for Use in Hazardous (Classified) Locations.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

C. Conform to requirements of the Arkansas State Fire Protection Code.

1.06 COORDINATION

A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections. Verify voltage, ampere, and phase ratings before beginning any of the work. Notify Engineer immediately of any discrepancies found. Any work installed that has to be replaced because of the contractor's failure to verify these ratings will not be reimbursed. Verify that equipment furnished under other sections has disconnects and starters, if so specified in other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.

D. Sequence electrical connections to coordinate with start-up schedule for equipment.

PART 2 PRODUCTS

2.01 CORDS AND CAPS

A. Manufacturers:
   1. Hubbell.
   2. Pass & Seymour.
   3. Arrow-Hart.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD-6; match receptacle configuration at outlet provided for equipment.

D. Cord Construction: ANSI/NFPA 70, Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

E. Size: Suitable for connected load of equipment, length of cord, and rating at branch circuit overcurrent protection.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using liquidtight flexible conduit with watertight connectors.

C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.

D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.

E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Install disconnect switches, controllers, control stations, and control devices as indicated and as required by applicable codes.

G. Provide interconnecting conduit and wiring between devices and equipment where indicated.

H. All flexible conduit to pumps, chillers, air handling units, outdoor equipment, and water heaters shall be liquidtight.

I. Ground all metal equipment. Ensure that bonding breaks through paint to bare metallic surface of all painted metallic equipment.

J. The contractor shall check overload settings, wire sizes, fuse/circuit breaker sizes & disconnect sizes of equipment provided by others for compliance with the National Electrical Code and shall:
   1. Adjust settings where possible.
   2. Advise the Engineer of non-compliance where remedy will require more than just adjustments.

END OF SECTION

SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONNECTORS AND CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building wire and cable.

B. Wiring connectors and connections.

1.02 RELATED SECTIONS

A. Section 26 0529 – Hangers and Supports for Electrical Systems.

B. Section 26 0533 – Raceway and Boxes for Electrical Systems.

C. Section 26 0553 – Identification for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NETA - National Electrical Testing Association.

C. UL 83 - Thermoplastic Insulated Wires and Cables.

D. UL 486 A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.

E. UL 486 C - Splicing Wire Connectors.

F. UL 1581 - Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide for each wire and cable type.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Conductors shall be copper.

C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.

D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.08 COORDINATION

A. Determine required separation between cable and other work.

B. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.01 MANUFACTURERS - BUILDING WIRE AND CABLE

A. Triangle.

B. American.

C. Engineer Approved.

2.02 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: ANSI/NFPA 70, Type THW (feeder circuits) and THHN/THWN (branch circuits).

2.03 WIRING CONNECTORS/LUGS

A. All cable and wire terminals, lugs, taps, and splices shall be made secure with compression type connectors, approved for the service. Connections shall be installed with approved tools and dies to assure a permanent secure joint. Compression joints shall be cleaned and made smooth with insulating compound. Connectors in dry locations shall be wrapped with varnish cambric and insulated with approved electrical grade plastic tape. Where conductors are to be connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed. Provide all necessary hangers, racks, cleats, and supports required to make a neat installation. Wire connectors shall conform to UL 486.

B. Connectors in wet or damp locations shall be covered with heat shrinkable products equal to Scotch #ITCSN Series.

C. Contractor shall provide and install all connectors, taps, lugs, and splices as required to connect all wires and cables provided under the contract. Contractor shall torque all bolted connections to manufacturer's specifications. If manufacturer's specifications do not apply, use NETA specifications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation verify that interior of building has been protected from weather.

B. Prior to installation verify that mechanical work likely to damage wire and cable has been completed.

3.02 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.03 WIRING METHODS

A. Interior Locations: Use only building wire, Type THW or use THHN/THWN insulation, in raceway unless otherwise indicated on the Drawings.

B. Wet or Damp Interior Locations: Use only building wire, Type THW or THHN/THWN in raceway or liquidtight flexible conduit.

C. Exterior Locations: Use only building wire, Type THW or THHN/THWN insulation in raceway.

D. Underground Installations: Use only building wire, Type THW or USE insulation in raceway.

E. Use wiring methods indicated on Drawings.

F. On the load side of GFIC circuit breaker, use only Type XHHW conductors.

3.04 INSTALLATION

A. Install products in accordance with manufacturers instructions.

B. Use solid conductors for feeders and branch circuits No 10 AWG and smaller, except branch circuits to motors shall be stranded copper for flexibility. Stranded conductors may be used if tapped to solid conductors before terminating to wiring devices.

C. Use stranded conductors for control circuits 24 volts and below. Minimum size shall be No. 16 AWG.

D. Use conductors not smaller than No. 12 AWG for power and lighting circuits and 120 volt control circuits.

E. Use No. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet or where the distance to the first outlet exceeds 50 feet.

F. Use No. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

G. Pull all conductors into raceway at same time.

H. Use suitable wire pulling lubricant for building wire No. 4 AWG and larger.

I. Protect exposed cable from damage.

J. Support cables above accessible ceiling, using spring metal clips to support cables from structure. Do not rest cable on ceiling panels.

K. Use suitable cable fittings and connectors.

L. Neatly train and lace wiring inside boxes, equipment, and panelboards.

M. Clean conductor surfaces before installing lugs and connectors.

N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise. Split bolt connectors are not allowed.

O. Use sleeve compression connectors for copper conductor splices and taps, No. 6 AWG and larger. Insulated uninsulated conductors and connector with heat shrink insulation rated 600 volts.

P. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, No. 8 AWG and smaller.

Q. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, No. 10 AWG and smaller.

R. Route circuits at own discretion; however, circuit numbers shall be according to Drawings.

S. Do not share neutral or ground on computer circuits. Each circuit shall be run in a separate raceway.

T. For branch circuits, do not use common neutrals, install a dedicated neutral conductor with each circuit.

U. Run conductors of same circuit in same conduit.

V. Run conductors of different voltage system in separate conduits.

W. Color-code conductors as follows:

208Y120 Volts	Switchlegs	480Y277 Volts	Switchlegs
Phase A Black	Violet	Brown	Violet
Phase B Red	Pink	Orange	Pink
Phase C Blue	Yellow		
Ground	Green	Green	

Neutral	White	Gray

X. Contractor shall not install more than three (3) current-carrying conductors in one conduit without derating the conductors per NEC Table 310-15(b)(2)(a).

Y. Where cables not in conduit pass through floors, cables shall be enclosed in conduit extending at least 6 inches above the floor.

Z. Cables shall be protected from physical damage where necessary by conduit.

AA. All cable splices shall be made in boxes.

BB. The radius of bends in cables shall not be less than five times the diameter of the cable.

CC. Cables shall be secured by staples, straps, j-hooks, or similar fittings every 4-1/2 feet and within 12 inches of every cabinet, box and fitting.

DD. Do not pull cable sheaths back more than necessary to separate conductors.

EE. Do not score conductors when peeling back conductor insulation. Scored conductors will be replaced.

FF. Do not cut off strands from stranded conductors at terminations. Conductors with strands missing shall be replaced.

GG. Kinked, torn, or twisted cable sheaths are unacceptable and shall be replaced.

HH. Install wire and cables to avoid chemicals, cold temperature bending, and different lengths of conductors of same circuit.

II. Make sure conduits are properly terminated, reamed and brushed before installation of wire and cables.

JJ. Cable sheaths shall be held in place by strain relief fittings.

KK. Verify proper conductor location at each termination before energizing.

LL. All parallel conductors shall be of the same length, type, size and shall have the same connector pressures.

MM. Do not splice service entrance or feeder conductors.

NN. Maintain 18 inch clearance from all wires and cables to hot water pipes, steam pipes, and flues.

OO. Route all cables parallel and perpendicular to walls. This includes cables installed above ceilings, in attics, and in crawl spaces.

3.05 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of 26 0553 – Identification for Electrical Systems.

B. Identify each conductor with its circuit number or other designation indicated on Drawings in each junction box, switch, switchboard, control panel, and in each panelboard.

3.06 FIELD QUALITY CONTROL

A. Perform field inspection and testing.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values, if applicable. If not applicable, use NETA's recommended values.

D. Verify continuity of each branch circuit conductor.

E. Check tightness of all connections.

3.07 USE OF THE FOLLOWING IS PROHIBITED

A. Aluminum conductors.

B. Wire nuts in damp or wet locations.

C. Copper-clad aluminum conductors.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

D. Chemicals.

E. Conduit.

1.02 RELATED SECTIONS

A. Section 26 0519 – Low Voltage Electrical Power Conductors and Cables.

B. Section 26 0533 – Raceway and Boxes for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. UL 467 - Grounding and Bonding Equipment.

1.04 GROUNDING ELECTRODE SYSTEM

A. Metal underground water pipe, if any.

B. Metal frame of the building, if any.

C. Electrode.

D. Rod electrode.

E. "GEM encased in direct contact with earth.

1.05 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: No greater than 5 ohms.

1.06 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide data for grounding electrodes and connections.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of exothermic connectors.

1.07 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual locations of grounding electrodes.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years documented experience.

1.09 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 PRODUCTS

2.01 ROD ELECTRODE

A. Material: Copper clad steel.

B. Diameter: 3/4 inch.

C. Length: 10 feet.

2.02 WIRE

A. Material: Stranded or solid copper.

B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

C. Wire shall conform to Section 26 059.

2.03 EXOTHERMIC CONNECTIONS

A. Cadweld.

B. Approved Equal.

2.04 CHEMICALS

A. Ground enhancement materials (50 lbs. minimum per rod).

B. Cadweld "GEM" system, or approved equal.

2.05 CONDUIT

A. Conduit shall conform to Section 26 0533.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that final backfill and compaction has been completed around area where chemical ground is to be installed.

3.02 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Auger a 3 inch diameter hole to a depth of 9-1/2 feet.

C. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Drive rod 1 foot into ground. Make Cadweld connection. Pour chemicals around rod. Tamp around rod. Pour water in augered hole. Remove excess water from hole. Fill remainder of augered hole with soil. Tamp soil.

D. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.

E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus or bushing.

F. Size and type of green equipment ground conductors and method of securing then to obtain electrical continuity and effective grounding as per National Electrical Code, Article 250. Conduit shall not be used for grounding.

G. Neutrals shall be grounded in accordance with the National Electrical Code.

H. All metal raceway system, including cabinets, conduit and boxes, shall be grounded in accordance with the National Electrical Code.

I. An equipment ground conductor shall be installed in all conduits.

J. Install a grounding electrode and grounding electrode conductor at each dry type transformer.

K. The grounding electrode shall be connected to the metal structure of all buildings with metal structures and to a 1-1/2 inch or larger cold-water pipe, if metallic. The ground connection to the metal structure shall be exothermic.

L. All unburied grounding conductors shall be installed in conduit.

M. Connect equipment ground conductor of branch circuits serving gas appliances to metallic gas lines. Do not use metallic gas lines as a grounding electrode of the electrical system.

N. Ground all metal non-current carrying equipment. Ensure that bonding breaks through paint to bare metallic surface of all painted metallic equipment.

3.03 FIELD QUALITY CONTROL

A. Inspect equipment grounding conductors and connections for tightness and proper installation.

B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit, cable and equipment supports.

B. Anchors and fasteners.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NECA - National Electrical Contractors Association.

C. UL 514B - Fittings for Conduit and Outlet Boxes.

1.03 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide manufacturer's catalog data for fastening systems.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Materials and Finishes: Provide adequate corrosion resistance.

B. Provide materials, sizes, and types of anchors, fasteners, and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

C. Perforated strap iron will not be acceptable as hanger or fastening material.

D. Plastic tie wraps will not be acceptable as support materials, except:
   1. Inside enclosures to neatly train cables and wires.

E. Channels shall be galvanized and not painted.

F. All hardware shall be galvanized.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

C. Do not fasten supports to pipes, ducts, mechanical equipment, and other conduit.

D. Obtain permission from the Engineer before using powder-actuated anchors.

E. Obtain permission from the Structural Engineer before drilling or cutting structural members.

F. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

G. Install surface-mounted cabinets with minimum of four anchors. Provide blocks between studs to support anchors.

H. In wet and damp locations use steel channel supports to stand cabinets one inch off wall.

I. All conduits, both horizontal and vertical, shall be accurately supported. Each hanger shall be properly sized to fit supported conduit.

J. Where lines are supported under concrete construction, hanger rods shall be secured with concrete inserts.

K. All hangers shall be so located as to properly grade and support horizontal conduits without appreciable sagging of these lines.

L. Where multiple conduits are run horizontally at the same elevation and grade, they may be supported on trapezes of channels suspended on rods. Trapeze numbers, including suspension rods, shall be properly sized for number, size, and loaded weight of conduits to be supported. Refer to seismic restraint requirements.

M. Conduit supports shall be installed within 3 feet of each coupling, connector, and box.

N. Electrical contractor shall install his own supports for his equipment.

O. All 2 inch and larger conduits shall have a swivel hanger support equal to B-Line #B446 or #B446C.

END OF SECTION

SECTION 26 0533
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rigid steel conduit.

B. Flexible metal conduit.

C. Liquid-tight flexible metal conduit.

D. Electrical metallic tubing.

E. Surface mounted raceway.

F. PVC conduit.

G. Fittings and conduit bodies.

H. Wall and ceiling outlet boxes.

I. Floor boxes.

J. Pull and junction boxes.

K. Under Floor Duct

1.02 RELATED SECTIONS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 – Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems.

D. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

E. Section 26 2726 - Wiring Devices.

F. Section 26 0502 - Equipment Wiring Systems.

1.03 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

C. ANSI/NFPA 70 - National Electrical Code.

D. NECA "Standard of Installation".

E. NEMA TC 3 - PVC Fittings to Use with Rigid PVC Conduit and Tubing.

F. UL 1 - Flexible Metal Conduit.

G. UL 5 - Surface Metal Raceways and Fittings

H. UL 6 - Rigid Metal Conduit.

I. UL 360 - Liquid-tight Flexible Steel Conduit.

J. UL 652 - Schedule 40 Rigid PVC Conduit

K. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

M. UL 38 - Boxes for Use with Fire-Protection Signaling Systems, Manually Actuated Signaling.

N. UL 50 - Cabinets and Boxes.

O. UL 514A - Metallic Outlet Boxes.

P. UL 514B - Fittings for Conduit and Outlet Boxes.

Q. UL 996 - Electrical Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

R. UL 1241 - Junctions Boxes for Swimming Pool Lighting Fixtures.

S. UL 1773 - Termination Boxes.

T. UL 65 - Wired Cabinets.

1.04 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.05 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide for metallic conduit, flexible metal conduit, Liquid-tight flexible metal conduit, metallic tubing, non-metallic conduit, fittings, and conduit bodies.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.06 PROJECT RECORD DOCUMENTS

A. Accurately record actual routing of conduits larger than 2 inches.

B. Submit under provisions of Division 1.

C. Accurately record actual locations and mounting heights of outlet, pull, and junction boxes.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site.

B. Inspect all conduits for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.09 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit and openings prior to rough-in.

C. Route conduit as shown on Drawings in approximate locations unless specifically dimensioned. Route as required to complete wiring system.

D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. The exact location of all electrical boxes shall be as approved by Engineer who reserves the right to change any outlet for a distance of 6

feet in any direction from position shown on plans, before work is roughed-in, without extra charge.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Minimum Size: 3/4 inch unless otherwise specified.

B. Underground Installations:
   1. Conduit installed below grade shall be Schedule 40 PVC. All elbows and riser up thru floor slabs shall be galvanized rigid steel conduit (RSC).
   2. All conduit not installed under the floor slab shall be 24 inches below grade unless otherwise noted.

C. Outdoor Locations, Above Grade, and On Roofs: Use galvanized rigid steel conduit. On roofs install 4 inch by 4 inch square treated wooden blocks on roof to support rigid steel conduit within 3'-0" of each coupling and box and to support Liquid-tight flexible conduit every 3'-0".

D. Dry Locations:
   1. Concealed: Use electric metallic tubing.
   2. Exposed:
      a. Use galvanized rigid steel conduit in unfinished areas only (Electric Room, Mechanical Room) unless noted otherwise.
      b. Use surface metal raceway where specifically indicated in finished areas of existing buildings where it is impossible to fish flexible metallic conduit down inside of existing walls.

E. Mechanical and Electrical Rooms:
   1. Use 6'-0" maximum length Liquid-tight flexible conduit for final connections to mechanical equipment and dry type transformers. Support all flexible conduit every 3'-0".
   2. Use galvanized rigid steel conduit where exposed.

F. Electrical metallic tubing (EMT) is to be used for all HVAC equipment control wiring. The conduit system for HVAC temperature controls is to be furnished and installed by Division 15 in accordance with the requirements specified herein. Line voltage control work not specifically shown on the electrical drawings shall be furnished and installed by Division 15 with all line voltage work and all conduit work performed by licensed electricians.

G. Use surface metal raceway only in existing facilities where conduit cannot be fished down walls or across finished ceilings. Surface metal raceway shall not be used in new buildings, unless noted on the Drawings.

2.02 RIGID STEEL CONDUIT

A. Manufacturers:
   1. Allied.
   2. Triangle.
   3. Engineer Approved.

B. Rigid Steel Conduit: ANSI 80.1

C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

A. Manufacturers:
   1. Allied.
   2. Triangle.
   3. Engineer Approved.

B. Description: Interlocked steel construction.

C. Fittings: ANSI/NEMA FB 1.

D. Maximum Length: 6'-0".

2.04 LIQUID-TIGHT METAL CONDUIT

A. Manufacturers:
   1. Allied.
   2. Triangle.
   3. Engineer Approved.

B. Description: Interlocked steel construction with PVC jacket.

C. Fittings: ANSI/NEMA FB 1.

D. Maximum Length: 6'-0".

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied.
   2. Triangle.
   3. Engineer Approved.

B. Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; die-cast compression type.

2.06 SURFACE METAL RACEWAY

A. Manufacturers:
   1. Wiremold.
   2. Engineer Approved.

B. Description: Surface metal raceway with hidden supports.

C. Fittings, Boxes, and Conduit Bodies: As manufactured by surface metal raceway manufacturer.

2.07 NONMETALLIC CONDUIT

A. Manufacturers:
   1. Carlon.
   2. Engineer Approved.

B. Description: NEMA TC 3; Schedule 40 PVC.

C. Fittings and Conduit Bodies: NEMA TC 3.

2.08 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported, include 1/2 inch male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.
   3. Receptacle, single switch, and 2 gang switch boxes for wood studs shall be Raco #194 or #235 with plaster ring of proper depth.
   4. Receptacle, single switch, and 2 gang switch boxes for metal studs shall be Raco #196 or #235 with plaster ring for proper depth.
   5. Gang switches of 3 or more devices for wood or metal studs and exposed work shall be Raco #950 Series, appropriate gang box and raised cover.
   6. Lighting fixture outlet boxes for wood or metal studs, masonry walls, and furred ceilings shall be Raco #166, #167, or Raco #194 or #235 with plaster ring.
   7. Junction boxes for wood or metal studs, masonry walls, furred ceilings and interior exposed work shall be Raco #231, #232, #233, or #235.

8. Receptacle boxes for masonry walls shall be Raco #695 or #191 with #785 device cover.
9. Switches in 6 inch and wider masonry walls shall be 3-1/2 inch deep masonry boxes of gang required. Masonry boxes in 4 inch walls shall be 2-1/2 inches deep.
10. Television outlet boxes shall be Raco #246, 4-1/16 inch box with #836 device cover ring. Telephone outlet boxes shall be Raco #256.
11. Outlet boxes for interior exposed work in unfinished areas shall be Raco #191, #192, #231, or #232 boxes with 1/2 inch raised, 4 inch square cover of appropriate configuration.
12. Boxes, for interior exposed work on existing walls and ceilings in finished areas in existing buildings, where it is impossible to fish conduit down walls or above ceilings, shall be boxes as manufactured by the surface metal raceway manufacturer for the intended purpose.

B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer.

C. Boxes shall be oversized when required by Table 370-16(a) of the National Electrical Code.

2.09 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Surface-Mounted Cast Metal Box: NEMA 250, Type as required; flat-flanged, surface-mounted junction box.
   1. Material: Galvanized steel.

C. Cover: Furnish with ground flange, neoprene gasket, and stainless-steel cover screws.

2.10 UNDER FLOOR DUCT

A. Under floor duct systems shall be as specified on the Drawings, installed per the manufacturer's directions/requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install conduit in accordance with NECA "Standard of Installation".

B. Install surface metal raceway in accordance with manufacturer's directions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Supports shall be installed within 3 feet of every outlet box, junction box, panel, or other conduit terminations. Fastening of unbroken lengths shall be permitted to be increased to a distance of 5 feet where structural members do not readily permit fastening within 3 feet. Do not space supports further than 10 feet apart.

E. Group related conduits; support using conduit rack. Construct rack using steel channel.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route all conduit parallel and perpendicular to walls. This includes conduit installed above ceilings, in attics, on roofs, and in crawl spaces.

K. Install insulated bushings or approved equivalent on each end of all conduit.

L. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 °F.

M. Cut conduit square using saw or pipe cutter; de-burr cut ends.

N. Bring conduit to shoulder of fittings; fasten securely.

O. Install no more than equivalent of four 90° bends between boxes. Use factory elbows for all 90° bends in conduits 1" and larger.

P. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

Q. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.

R. Use suitable caps to protect installed conduit against entrance of dirt and moisture during construction.

S. Ground and bond conduit under provisions of Section 26 0526.

T. Identify conduit under provisions of Section 26 0553.

U. Provide suitable pull-boxes in all conduit runs as required by the National Electrical Code and as required to facilitate wire installation.

V. Holes for passage of conduits through all one-hour and two-hour drywall partitions shall be neatly cut to the required size. If holes are cut larger than necessary, they shall be covered with two (2) additional pieces of 5/8 inch type X gypsum wallboard, each 8 inches by 16 inches with a half circular cutout of the proper size, one (1) layer on one-hour partitions, and two (2) layers on two-hour partitions.

W. Holes for passage of conduits through one-hour, two-hour, and four-hour masonry walls shall be fireproofed. Fireproofing materials shall be as follows:
   1. Cellular Glass Insulation: Pittsburgh Corning Corp. Foamglas "Regular" or UL rated or UNI-JAC UL rated pipe insulation, or approved equal.
   2. Fire Retardant Putty: IPC Flame-safe Type FAS500 or FST600 Series, or improved equal, for one-hour and two-hour walls.
   3. IPC/KB5 Mortar Seal, or approved equal (full depth of wall) for four-hour walls.

X. Holes for passage of conduits through masonry floors shall be fireproofed. Fireproofing material shall be Firestop Compound - IPC Flame-safe Type 500/FST 600, or approved equal, filled to full depth of slab. Minimum annular space around conduit shall be 3/16 inch.

Y. Refer to Architectural drawings for locations of fire-rated walls, ceilings, and floors.

Z. Support 2-1/2 inch and larger conduit in accordance with Section 26 0548.

AA. All flexible conduits in Mechanical Rooms and outside shall be Liquid-tight flexible conduit.

BB. All conduits that enter a building's basement wall below grade shall have a fitting equal to OZ Type CSBI installed inside the conduit and shall be watertight sealed between outer conduit wall and basement opening.

CC. Conduits, which enter refrigerated areas, such as walk-in coolers and wall-in freezers, shall have a seal-off installed on the non-refrigerated side of the conduit where the conduit exits or enters the refrigerated area.

DD. Make sure conduits are properly terminated, reamed, and brushed before installation of wire or cable.

EE. Install bushings on all conduits.

FF. Structural Engineer shall approve placement of conduits in all concrete slabs, beams, and columns. See Structural Drawings for structural engineer's name and address.

GG. Conduits which pass from an air-conditioned space to a non-air-conditioned space shall have seal-offs installed on non-air-conditioned side near wall.

HH. Ground the metallic conduits.

II. Install gasketed conduit hubs on all conduits exiting the top or sides of NEMA 3R enclosures.

JJ. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements.

KK. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

LL. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

MM. Install boxes to preserve fire resistance rating of partitions and other elements.

NN. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

OO. Use flush mounting outlet boxes in finished areas, unless noted otherwise on the Drawings.

PP. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch separation. Provide minimum 24 inch separation in acoustic rated walls. See Architectural floor plans for acoustic rated wall locations.

QQ. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

RR. Use stamped steel bridges to fasten flush mounting outlet box between studs.

SS. Install flush mounting box without damaging wall insulation or reducing the effectiveness.

TT. Use adjustable steel channel fasteners for hung ceiling outlet box.

UU. Do not fasten boxes to ceiling support wires.

VV. Support boxes independently of conduit.

WW. Use gang box where more than one device is mounted together. Do not use sectional box.

XX. In other than masonry, use 4-inch square by 1-1/2 inch minimum box with plaster ring for single devices.

YY. Use cast outlet box in exterior locations exposed to the weather and wet locations.

ZZ. Use cast floor boxes for installations in slab on grade. See plans for specialty A/V floor-boxes equal to FSR. Coordinate cover trim with floor covering thickness and type.

AAA .Set floor boxes level.

BBB. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
1. Interior Dry Locations: Use hinged enclosure.
2. Other Locations: Use surface-mounted cast metal box.

CCC. Locate boxes so outlets are not obstructed by pipes, ducts, or other items.

DDD. Boxes for light switches shall generally be located within 6 inches of door jamb.

EEE. Pull-boxes shall be provided at points shown on plans or required to overcome mechanical difficulties due to arrangement of runs or the fixed characteristics of the building construction. No runs of over 100 feet shall be made without use of pull-box.

FFF. All boxes shall have covers. All boxes installed above a ceiling and installed in unfinished spaces (Mechanical and Electrical Rooms, etc.) shall have the covers clearly and legibly marked with the circuits contained within them.

GGG. All flush-mounted boxes shall come within 1/4 inch of finished non-combustible surfaces and

shall be flush with finished combustible surfaces. Install box extensions, if after rough-in and wall construction, the boxes do not come out far enough.

HHH. Fireproof all poke-through devices in accordance with manufacturer's directions.

III. Ground all boxes. Ensure that bonding breaks through paint to bare metallic surface.

JJJ. Grind ears off of 2-gang boxes with isolated ground receptacles in each box. Grinding shall be done in a machine shop.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance of partitions and other elements.

B. Pull-boxes shall be provided at points shown on the plans or required to overcome mechanical difficulties due to arrangement of runs or the fixed characteristics of the building construction.

C. All threaded conduit shall be secured to boxes, cabinets, panels, switches, etc. by means of a threaded bushing on the inside and lock-nutted on the box exterior and interior.

D. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

E. Coordinate mounting heights and locations of outlets mounted above counters, branches, and backsplashes with Architect prior to rough-in.

F. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

3.03 THE FOLLOWING ARE PROHIBITED

A. EMT crimp-on, tap-on, indenter type fittings.

B. EMT set- screw fittings. Set-screw fittings on ends of flexible conduit are allowed.

C. PVC inside buildings, or above grade.

D. All thread nipples in other than dry locations.

E. Wooden plugs inserted in concrete or masonry units as bases for fastening conduits, tubing, boxes, cabinets, or other equipment.

F. Installation of conduit or tubing which has been crushed or deformed.

G. Where conductors #8AWG or larger are inside, the following fittings shall not be used:
   1. 90° threaded hubs.
   2. Pulling elbows.
   3. Bushed elbows.
   4. Short box connectors.
   5. 90° connectors.
   6. Entrance elbows.
   7. Types LB, LL, LR, T, L, TA, TB, X, LBD, or LBDN conduit bodies.
   8. Short elbows.

H. Type ENT tubing.

I. Armored cable.

J. Metal-clad cable.

K. EMT on roof, exposed, outside, in concrete, or underground.

L. Flexible or Liquid-tight flexible conduits concealed in walls or floors.

M. PVC elbows.

N. Storage of PVC in sunlight.

O. The use of heat to bend PVC conduit.

P. Surface non-metal raceway.

Q. Surface metal raceway in new buildings.

R. Surface metal raceway in damp or wet locations.

S. Flexible or Liquid-tight flexible conduits in lengths exceeding 6'-0".

T. The use of external cover-clips on surface metal raceway.

U. All steel EMT fittings.

V. Flexible conduit connectors on which the flexible conduit is threaded.

W. Plastic boxes.

X. Fiberglass boxes.

END OF SECTION

SECTION 26 0548
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. The requirements for seismic protection measures to be applied to electrical equipment specified herein are in addition to any other items called for in other sections of these specifications. The seismic protection shall conform to Category D of the 2021 Arkansas Fire Prevention Code. The electrical equipment shall include the following items to the extent required on plans or in other sections of the following specifications:

Conduit, 2-1/2 inches or larger
Panelboards
Cable Trays
Switches
Light Fixtures
Switchboards
Communication Racks

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Electrical Requirements - Section 26 0500.

1.03 APPLICABLE PUBLICATIONS

A. American National Standards Institute, Inc. (ANSI):
   1. B18.2.1-1981
   2. B18.2.2-1972

B. American Society for Testing and Materials (ASTM):
   1. A36-84a
   2. A307-84
   3. A325-85
   4. A501-84
   5. A576-81

C. Federal Specifications:
   1. RR-W-410D

D. NEMA
   1. 250 Enclosures for Electrical Equipment
   2. IC56

1.04 REGULATORY REQUIREMENTS

A. Conform to NFPA 70 - National Electrical Code and International Building Code.

B. Conform to 2021 Fire Prevention Code.

PART 2 PRODUCTS

2.01 Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and shown.

2.02 Sway brace of structural steel conforming with ASTM A36.

2.03 Mechanical couplings of the sleeve type to provide a tight flexible joint under all reasonable conditions.

2.04 Square-head bolts and heavy hexagon nuts, ANSI B18.2.1 and B12.2.2 and ASTM A307 or 306.

2.05 Guy wires where required shall conform to Fed Spec. RR-W-441 as follows:

5/32" diameter	Type V, Class 1
3/16" to 5/16" diameter	Type V, Class 2
1/4" to 5/8" diameter	Type I, Class 2

PART 3 EXECUTION

3.01 All rigidly mounted equipment will have a minimum of four (4) anchor bolts securely fastened through bases or backs. Anchor bolts must conform to ASTM A307. Anchor bolts shall have an embedded straight length equal to at least twelve times the nominal diameter of the bolt and shall conform to the applicable tables for various equipment weights.

Maximum Equipment Weight (Pounds)	
500	½
1,000	½
5,000	1/2
10,000	1/2
20,000	1/2
30,000	5/8
50,000	3/4
100,000	1

Based on four (4) bolts per item; a minimum embedment of 12 bolt diameters, a minimum bolt spacing of 16 bolt diameters and a minimum edge distance of 12 bolt diameters. Use equivalent total cross-sectional area when more than four bolts per item are provided. Anchor bolts that exceed normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths. When height-to-width ratio of the equipment exceeds 8.9, overturning must be investigated. Expansion anchors shall not be used to resist seismic or vibratory loads unless test data are provided to verify the adequacy of the specific anchor and application. In no case shall the expansion anchor size be less than that required for bolts in the preceding table. Selection of anchor bolts for vibration isolation devices and/or snubbers to equipment base and foundations shall follow the same procedure, except that an equipment weight equal to five times the actual equipment weight shall be used. Vibration isolation devices shall be selected so that the maximum movement of equipment from the static deflection point shall be 0.5 inches.

3.02 Equipment Sway Bracing shall be provided for all items supported from overhead floor or roof structures. Braces shall consist of angles, rods, bars, or pipes run at a 45° angle from the equipment frame to the building structure secured at both ends with no less than 1/2 inch bolts. Braces shall conform to all applicable codes and standards for Seismic Classification. Bracing shall be provided in two planes of directions, 90° apart, for each item of equipment. Details of all equipment bracing shall be submitted for approval. In lieu of bracing with vertical supports, these items may be supported with hangers inclined at 45°, provided that supporting members are properly sized to supporting operating weight of equipment when inclined at a 45° angle.

3.03 All recessed fluorescent light fixtures shall have seismic clips firmly situated over tops of ceiling grid tees or plaster frames.

3.04 Sway bracing shall be provided for all 2-1/2 inch or larger conduits, not individually supported with hangers 12 inches or less in length.

3.05 All 2-1/2 inch or larger conduits entering or leaving a building or structure shall have a flexible seismic expansion fitting installed within the earth prior to entering the building or after leaving the building. Fitting shall be within 5'-0" of building or structure. Fitting shall be equal to Appleton Type DF.

3.06 All light fixtures that weight more than 50 pounds shall have a safety chain or safety cable in addition to its other support.

3.07 Sway bracing shall be provided for all cable trays.

3.08 Communications racks shall be bolted to floor. Tops of racks shall be bolted to walls.

3.09 Cable trays and conduits shall be independently supported and braced independently of the ceiling.

3.10 Powder-activated fasteners (shot pins) shall not be used for anchorage.

3.11 Vibration isolators shall have a bumper restraint in each horizontal direction, and vertical restraints shall be provided where required to resist overturning.

3.12 Internal coils of dry type transformers shall be positively attached to their supporting substructure within the transformer enclosure.

3.13 Slide-out components in electrical equipment shall have a latching mechanism to hold contents in place.

3.14 Electrical cabinet design shall conform to NEMA 250 and NEMA IC56.

3.15 The attachment of additional items weighing more than 100 pounds to electrical equipment is prohibited.

3.16 Friction clips shall not be used for anchorage attachments.

3.17 Oversized plate washers extending to the equipment wall shall be used at bolted connections through the base sheet metal if the base is not reinforced with stiffeners or not capable of transferring the required loads.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Trench tape.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.03 RELATED SECTIONS

A. Section 09 9100 - Painting: Boxes.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

B. Locations:
   1. Each electrical distribution equipment (switchboards, panelboards, enclosed circuit breakers, motor control centers, transformers) and control equipment enclosure (starters, disconnect switches, etc.).

C. Letter Size:
   1. Use 1/2 inch letters for identifying equipment designation and voltage.

D. Provide typewritten directory in each panelboard of circuit designations in clear/transparent protective envelope attached to inside of panelboard door.

E. Provide typewritten zone directory in each conventional fire alarm control panel in clear/transparent, protective envelope attached to inside of central panel door.

F. Provide nameplate on inside of each panelboard and main indicating color code scheme for the voltage of that panelboard and main, nameplates to be red with white characters.

2.02 WIRE MARKERS

A. Description: Tape or tubing type wire markers.

B. Locations: Each conductor at panelboard gutters switchboard gutters, motor control center

gutters, pull boxes, outlet and junction boxes, disconnect switches, motor starters, and at each load connection.

C. Legend:
   1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.03 TRENCH TAPE

A. Tape shall be detectable aluminum foil polyethylene laminate.

B. Tape shall be the following color and have the following wording:

Application	Color	Caution Wording
Electrical	Red	"Caution – Electric Line Buried Below"

C. Tape shall be equal to Panduit Type HTDU with width to match trench width.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using No. 4 round heat cadmium plated, steel self-tapping screws or nickel-plated brass plates.

C. Identify underground conduits using underground warning tape. Install one tape per trench at 6 inches below finished grade.

D. All fire alarm junction boxes and pull-boxes shall be painted red where concealed or exposed in mechanical or electrical rooms.

E. Both ends of pull-wires shall be identified by means of labels or tags, reading "PULLWIRE" and shall be numbered to refer to same pull-wire.

F. Install nameplates at each circuit breaker on all switchboards and large panelboards.

G. Install wire markers on wires in each junction box, panelboard, switchboard, control panel, etc.

H. Install typewritten "COMPUTER" with black letters and clear background on each cover-plate of receptacles adjacent to information outlets

I. Install nameplates at each device within motor control centers.

J. Install directory of addresses and corresponding devices and locations in each addressable fire alarm and security control panels.

K. All security junction boxes and pull-boxes shall be painted yellow where concealed or exposed in mechanical or electrical rooms.

L. Install labels on all telephone and computer cables.

M. All telephone junction boxes and pull-boxes shall be painted white where concealed or exposed in mechanical or electrical rooms.

N. Paint all data junction boxes and pull-boxes blue where concealed or exposed in mechanical or electrical rooms.

O. Paint all public address junction boxes and pull-boxes dark gray where concealed or exposed in mechanical or electrical rooms.

P. Paint all television cable junction boxes or pull-boxes black where concealed or exposed in mechanical or electrical rooms.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Branch circuit panelboards, new and existing.

B. Distribution panelboards, existing.

1.02 RELATED SECTIONS

A. Section 09 9100 - Painting: Touchup.

B. Section 26 0529 – Hangers and Supports for Electrical Systems.

C. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

D. Section 26 0553 - Identification for Electrical Systems: Engraved nameplates.

1.03 REFERENCES

A. NECA (National Electrical Contractors Association) "Standard of Installation."

B. NEMA AB 1 - Molded Case Circuit Breakers.

C. NEMA PB 1 - Panelboards.

D. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less.

E. NFPA 70 - National Electrical Code.

F. UL 67 - Panelboards.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement and sizes.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 RECORD DOCUMENTS

A. Record actual locations of Products; indicate actual branch circuit arrangement.

1.06 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.09 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.10 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.11 MAINTENANCE MATERIALS

A. Provide two of each panelboard key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens/ITE.

B. General Electric.

C. Square D.

D. Cutler-Hammer.

E. Existing panelboards and switchboard are Siemons.

2.02 PANELBOARDS

A. Panelboards: NEMA PB1, circuit breaker type.

B. Panelboard Bus: Tin-plated copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.

C. Minimum short circuit rating shall be as indicated on the Drawings. Panelboards shall have a fully rated interrupting rating. Series-rated equipment will not be accepted.

D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits. Install new circuit breakers in existing panelboards and switchboard as noted on the Drawings. Provide all bus ties, etc. as required.

E. Enclosure: NEMA PB 1, Type 1, or 3R as indicated on the Drawings.

F. Cabinet box: 6 inches deep; width: 20 inches for 240 volt and less panelboards.

G. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb. Provide supports in accordance with Section 16190.

C. Install panelboards with middle at 48 inches, if less than 6'-6" tall. If panelboard is taller than 6'-6 inches, install with top at 7'-6".

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. Provide engraved plastic nameplates under the provisions of Section 26 0529.

G. Provide a minimum of four (4) spare 20A/1P circuit breakers in each branch circuit panelboard or as indicated on the drawings.

H. Install all screws and bolts in cover-plates.

I. Install knockout plugs in all unused openings in enclosure.

J. Install nameplates on all circuit breakers of large panelboards.

K. Bolt panelboards to mounting surface in accordance with Section 26 0548.

L. Panelboards installed on basement walls or outside on exterior walls shall be installed on 1-1/2 inch channel.

M. The first section of multi-section panelboards shall have feed-through lugs. Contractor shall install conductors with ampacities equal to the bus rating of the panelboards, from the feed-through lugs to the main lugs only of Section #2 panelboard.

N. Touchup scratched or marred surfaces to match original finish.

O. Neatly form wire inside of panelboard.

3.02 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections using calibrated torque wrench for circuit breakers, bus stabs, and busses.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Occupancy Sensors.

D. Device plates.

1.02 RELATED SECTIONS

A. Section 26 0533 - Boxes.

B. Section 26 0553 - Electrical Identification: Labels on computer outlets.

1.03 REFERENCES

A. NEMA WD 1 - General Purpose Wiring Devices.

B. NEMA WD 6 - Wiring Device Configurations.

C. UL 20 - General Use Snap Switches.

D. UL 498 - Attachment Plugs and Receptacles.

E. UL 894 - Switches for Use in Hazardous (Classified) Locations.

F. UL 1010 - Receptacle Plug Combinations for Use in Hazardous (Classified) Locations.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Manufacturer's Instructions:
   1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
   2. Include instructions for storage, handling, protection, examination, preparation, operation, and installation of product.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 EXTRA MATERIALS

A. Provide protective rings and split nozzles as required and as specified.

PART 2 PRODUCTS (NO SUBSTITUTIONS)

2.01 WALL SWITCHES

A. Single Pole Switch:
   1. Hubbell #1221.
   2. Pass & Seymour #20AC1.
   3. Cooper Wiring Devices #2221.
   4. Leviton #1221.

B. Three-way Switch:
   1. Hubbell #1223.
   2. Pass & Seymour #20AC3.
   3. Cooper Wiring Devices #2223.
   4. Leviton #1223.

2.02 RECEPTACLES

A. Single Convenience Receptacle:
   1. Hubbell #5361.
   2. Pass & Seymour #5361.
   3. Cooper Wiring Devices #5361.
   4. Leviton #5361.

B. Duplex Convenience Receptacle:
   1. Hubbell #5362.
   2. Pass & Seymour #5362.
   3. Cooper Wiring Devices #5362.
   4. Leviton #5362.

C. GFCI Receptacle:
   1. Hubbell #GF5352.
   2. Pass & Seymour #2091.
   3. Cooper Wiring Devices #XGF20.
   4. Leviton #GF5352.
   5. Hubbell #GFTROXX for Tamper Resistant.

D. Color of devices as selected by Architect/Engineer.

2.03 OCCUPANCY SENSORS

A. APPROVED MANUFACTURES
   1. Hubbell
   2. WattStopper
   3. Engineer Approved

B. TYPE: Sensors shall be "Dual Technology" unless otherwise noted on plans

C. INSTALLATION
   1. The Occupancy Sensor system shall sense the presence of human activity within the desired space and fully control the "On" / "Off" function of the lights.
   2. Time Delay settings shall be set at 10 minutes. This delay selection is based on lamp life vs. energy savings and sensor performance. Corridors and Bathroom time delay shall be set for 30 minutes to provide safety in such areas.
   3. Contractor shall adjust sensor sensitivity so the device will operate properly.
   4. Manufacture specified on drawings is specific to design. If an alternate manufacture is selected, the contractor is responsible for additional sensors, power pack, and additional equipment to meet the design needs. Also, contractor is to provide manufactures drawings with sensor coverage located on drawings. The revised drawing shall be included with the shop drawings. Alternate plan will only be approved once the engineer has reviewed this information.

2.04 WALL PLATES

A. Cover Plates: Stainless steel.

B. Weatherproof Enclosures:
   1. Receptacles in wet locations shall be installed with an outlet enclosure clearly marked "Suitable for Wet Locations While in Use". There shall be a gasket between the enclosure and the mounting surface, and between the cover and the base to assure proper seal.
   2. The enclosure must employ stainless steel mounting hardware and be constructed of impact resistant polycarbonate. The outlet enclosure shall be UL listed and shall be as

manufactured by TayMac Corporation, or approved equal.

C. Wall-mounted Occupancy Sensors: Cove-plates shall be suitable for sensor type and shape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify conditions.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and will be completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

E. Verify color of all devices and cover-plates.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install devices plumb and level.

C. Install single and double pole switches with OFF position down.

D. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

E. Install plates on switch, receptacle, and blank outlets in all areas.

F. Connect wiring devices by wrapping conductor around screw terminal in clockwise direction and tightening screw. Where wiring device has two (2) plates tightened by a screw, this method may be used. However, other back-connected wiring devices, which depend upon a metal spring action, are not allowed.

G. Use jumbo size plates for outlets installed in masonry walls.

H. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings, and on surface mounted outlets.

I. All plates shall be secured by means of screws with heads matching plates.

J. Vertically mounted receptacles shall be installed with equipment grounds down, unless local codes require otherwise. Horizontally mounted receptacles shall be installed with equipment grounds to the right, unless local codes require otherwise. Regardless, all receptacles, including GFCI receptacles, shall be installed in the same way with the ground, turned in the same direction.

K. Install labels on computer outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 0533 to obtain mounting heights specified and indicated on Drawings.

B. Install wall switches 48 inches above finished floor to the center of the box.

C. Install convenience receptacle 18 (vertically oriented) inches above finished floor unless noted otherwise on Drawings.

D. Install convenience receptacle 6 (horizontally oriented) inches above finished counter.

3.05 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

F. Check tightness of all conductor connections.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

END OF SECTION

SECTION 26 2816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fusible switches.

B. Non-fusible switches.

C. Fuses.

D. Enclosed circuit breakers.

1.02 REFERENCES

A. ASME A17.1 - Safety Code for Elevators and Escalators.

B. NECA (National Electrical Contractors Association) "Standard of Installation".

C. NEMA AB 1 - Molded-Case Circuit Breakers.

D. NEMA KS 1 - Enclosed Switches.

E. NFPA 70 - National Electrical Code.

F. UL 50 - Enclosures for Electrical Equipment.

G. UL 98 - Enclosed and Dead-Front Switches.

H. UL 198C - High Interrupting Capacity Fuses; Current Limiting Type.

I. UL 198E - Class R fuses.

J. UL 363 - Knife Switches.

K. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures.

L. UL 1066 - Low Voltage AC and DC Power Circuit Breakers Used in Enclosures.

M. UL 1332 - Organic Coatings for Steel for Outdoor-Use Electrical Equipment Enclosure.

1.03 RELATED SECTIONS

A. Section 09 9100 - Painting: Touchup.

B. Section 26 0529 – Hangers and Supports for Electrical Systems.

C. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

D. Section 26 0553 - Identification for Electrical Systems.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Product Data: Provide switch ratings and enclosure dimensions.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Disconnect switches shall be heavy duty, as manufactured by,
   1. Square D
   2. General Electric
   3. Siemens ITE
   4. Cutler-Hammer

2.02 ENCLOSED SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch, with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses.

B. Non-fusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

2.03 ENCLOSED CIRCUIT BREAKERS

A. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R, lockable, freestanding where indicated.

B. Minimum integrated short circuit rating as indicated on the Drawings shall be fully rated rating. Series-Rated equipment will not be accepted.

C. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

D. Cabinet: Finish in manufacturer's standard gray enamel.

E. 480Y277 volt main circuit breakers rated 1000 amperes or more shall have ground fault protection.

2.04 FUSES

A. Manufacturers:
   1. Bussman.
   2. Gould-Shawmut.
   3. Little.

B. Description: Dual element, current limiting, time delay, one-time fuse, 600 volt, UL 198E, Class RK 1.

C. Interrupting Rating: 200,000 rms amperes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the electrical device where indicated.

B. Install fuses in fusible disconnect switches.

C. Install equipment ground bus in enclosed circuit breaker / switch.

D. Provide adhesive label on inside door of each switch indicating UL fuse class and size for replacement.

E. Provide label on outside cover as directed by Section 26 0553 - Identification for Electrical Systems.

F. Provide three (3) spare fuses of each type utilized.

G. Bolt enclosed circuit breaker / switch to mounting surface in accordance with Section 26 0529.

H. Where wall-mounted circuit breaker / switches are mounted to be operated from floor or grade, install switch with middle of switch at 48 inches, if switch is less than 6'-6" tall. If switch is taller than 6'-6" tall install, switch with top of switch at 7'-6".

I. When the electrical devices are installed on exterior basement walls or outside, the switches shall be mounted on 1-1/2 inch channels.

J. Enclosed switches for wall-mounted exhaust fans installed higher than 8' from the floor shall be installed high on the wall next to the exhaust fan.

K. Install nameplate on disconnect switch with designation of equipment being served by switch. If main switch, install "Main Disconnect" nameplate.

L. Touchup scratched or marred surfaces to match original finish.

M. Neatly form wires inside switches.

3.02 FIELD QUALITY CONTROL

A. Check tightness of conductor lugs using calibrated torque wrench.

END OF SECTION

SECTION 26 4300
TRANSIENT VOLTAGE SURGE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Main Distribution Panel.

B. Low Voltage Electronic Grade Panel.

1.02 RELATED SECTIONS

A. Section 09 900 - Painting: Touchup.

B. Section 26 0533 – Raceway and Boxes for Electrical Systems.

C. Section 26 0519 – Low-Voltage Electrical Power Connectors and Cable.

D. Section 26 0553 - Identification for Electrical Systems: Engraved nameplates.

E. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

1.03 REFERENCES

A. American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.41-1991 and C62.45-1987)

B. Canadian Standards Association (CSA)

C. Federal Information Processing Standards Publication 94 (FIPS PUB 94)

D. National Electrical Manufacturers Association (NEMA)

E. National Fire Protection Association (NFPA 70 (NEC), 75 and 78).

F. Underwriters' Laboratories - UL1449, 2nd Edition and UL1283.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. UL 1449 Suppression Ratings - Documentation of unit's UL 1449 suppression rating shall be included as required product data submittal information. Manufacturer shall make available upon request certified documentation of applicable Location Category C Testing in full compliance with ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1987 Guidelines.

1.05 REGULATORY REQUIREMENTS

A. Conform to NFPA 70, 75 and 78.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 OPERATION AND MAINTENANCE DATA

A. Equipment Manual - The manufacturer shall furnish an equipment manual with installation, operation and maintenance for the specified unit.

B. Drawings - Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.

C. Spare Parts - A list of customer-replaceable spare parts shall be included in the unit's installation, operation and maintenance instructions. All spare parts shall be quickly and easily field-replaceable.

1.07 QUALIFICATIONS, TESTING & WARRANTY

A. Warranty - The manufacturer shall provide an Unlimited Replacement Five Year Warranty from date of shipment on the entire electronic grade panel (suppression filter system unit, breakers and other panel components) against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

B. Quality Assurance - The unit shall be thoroughly factory-tested before shipment. Testing of each unit shall include, but shall not be limited to, quality assurance checks, MCOV, and clamping voltage verification tests.

C. MCOV Testing - The unit shall be factory tested and burned in at the applicable MCOV for a minimum of one (1) hour.

D. Start-Up Testing - Upon request by the engineer, and after completion of installation, a factory-certified local service technician shall perform testing services. The following tests shall be performed: (a) voltage measurements from L-G, L-N, L-L and N-G at the time of the testing procedure, (b) impulse injection to verify the system suppression voltage tolerances for all suppression paths. Test results shall be recorded, compared to factory benchmark test parameters supplied with each individual unit. A copy of the start-up test results shall be supplied to the engineer for confirmation of proper suppression filter system function. In addition, the integrity of the N-G bond shall be verified through testing.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Current Technology.

B. Liebert.

C. Cutler Hammer

2.02 GENERAL PERFORMANCE CRITERIA

A. Maximum Continuous Operating Voltage (MCOV) - The maximum continuous operating valve (MCOV) of all suppression components utilized in the unit shall not be less than 125 percent of the facility's nominal operating voltage for 120 volt nominal systems and not less than 115 percent of the facility's nominal operating voltage for 220, 240, 277, 347, 480, 575, and 600 volt nominal systems.

B. High Frequency Extended Range Tracking Filter - The unit shall include a UL 1283 high - frequency, error producing transients and electrical line noise to harmless levels, thus eliminating disturbances, which may lead to system upset. The filter shall provide minimum insertion loss as follows:

Attenuation Frequency	100 kHz	1 MHZ	10 MHZ	100 MHZ
Insertion Loss (dB)	41	31	35	53

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-E220A 50 ohm insertion loss methodology.

C. Performance Ratings - The unit's published performance ratings shall be the UL1449 Listed suppression ratings. The UL1449 Suppression Rating shall be, for each mode of protection, as follows:

VOLTAGE	L-L	L-N	L-G	N-G
120/240	800	400	400	400
120/208	800	400	400	400
277/480	1500	800	800	800
347/600	2000	1000	1000	1000

D. Operating Frequency - The operating frequency range of the unit shall be 47 to 63 Hertz.

E. Protection Modes - The unit's primary mode of protection shall be line-to-line (delta-configured systems) or line-to-neutral (wye-configured systems). The secondary modes of protection shall be line-to-ground and neutral-to-ground (wye configured systems) or line-to-ground (delta-configured systems).

2.03 MAIN DISTRIBUTION PANEL PROTECTION

A. Tested Single Pulse Surge Current Capacity - Based on ANSI/IEEE C 62.41-1991's standard 8 by 20 microsecond current waveform, the single pulse surge current capacity, in amperes, of the unit (not individual module) shall be no less than as follows:

Mode of Protection	L-L	L-N	L-G	N-G
Tested Single Pulse Surge Current Capacity Per Protection Mode	100,000	100,000	100,000	100,000

In compliance with NEMA LS 1-1992, the suppression filter unit shall be single pulse tested in all modes up to 150% of the product design rating by an industry-recognized independent test laboratory.

B. Life Expectancy Testing - The unit shall be capable of protecting against and surviving at least 2,500 ANSI/IEEE C62.41-1991 Category C3 surges without failing or degrading the UL 1449 Surge Suppression Rating by more than 10 percent. The unit shall be able to survive a

steady state voltage swell in excess of 125% of nominal voltage for 60 seconds without damage to the unit.

C. Integral Disconnect Switch - The unit shall include an integral fused and safety interlocked disconnect switch located in the unit enclosure with an externally mounted manual operator. The switch shall disconnect all ungrounded circuit conductors from the distribution system to enable testing and maintenance without interruption of power to the facility's distribution system. The switch shall be rated for 600 VAC.

D. Filter System - Each suppression filter system element (selenium cell, MOV, polyprophelene capacitor) shall be individually fused with 200 KAIC rated fuse links recognized under UL 248 in order to provide maximum fault current protection. The unit must be tested to full rated surge current without failure of any component (including fuse links).

E. Diagnostic Monitoring Option - The unit shall be provided with the following features: Dual Form "C" dry contacts, battery powered audible alarm with disable switch, phase indicator lights, LED status indicator, transient voltage surge counter and test switch.

F. Internal Connections - All internal wiring associated with the suppression/filter system and subject to surge currents shall utilize low impedance copper bus bar and/or #1/0 AWG copper conductor or larger. All internal connections associated with the suppression/filter system and subject to surge currents shall be made with compression solderless-type lugs and shall be bolted to the bus bars in order to reduce overall system impedance.

G. Field Connections - The unit shall include mechanical lugs for each phase, neutral and ground, if applicable. The lugs shall accommodate up to #2 AWG copper conductor with integral fused disconnect switch.

H. Field Installation - The unit shall be installed as close as practical to the facility's wiring system in accordance with applicable national/local electrical codes and the manufacturer's recommended installation instructions. Connection shall be with #2 AWG copper conductor or larger and not be any longer than necessary, avoiding unnecessary bends.

I. Enclosure - Standard surface-mounted units shall be provided in a NEMA 4 metallic type enclosure. Dimensions shall not be greater than 22 inches wide by 38 inches high by 14.25 inches deep. Weight of standard surface-mounted units shall not exceed 125 lbs (maximum).

2.04 ELECTRONIC GRADE PANELBOARD

A. Unit Operating Voltage - The nominal unit operating voltage and configuration shall be as indicated on the Drawings.

B. High Performance Suppression System - The unit shall include an engineered solid-state high-performance suppression system, utilizing arrays of fused non-linear voltage dependent metal oxide varistors with similar operating characteristics. The suppression system's components shall optimally share surge currents in a seamless, loss-stress manner assuring maximum performance and proven reliability. The suppression system shall not utilize gas tubes, spark gaps, silicon avalanche diodes or other components which might short or crowbar the line, thus leading to interruption of normal power flow to or system upset of connected loads. The suppression system shall not incorporate any other components, which may degrade performance or reliability of the suppression system.

C. Tested Single Pulse Surge Current Capacity - Based on ANSI/IEEE C62.41-1991's standard 8 x 20 microsecond current waveform, the tested single pulse surge current capacity, in amperes, of the unit shall be no less than as follows:

Mode of Protection	L-L	L-N	L-G	N-G
Tested Single Pulse Surge Current Capacity Per Protection Mode	80,000	80,000	80,000	80,000

D. Life Expectancy Testing - The unit shall be capable of protecting against and surviving at least 2,500 ANSI/IEEE C62.41-1991 Category C3 surges without failing or degrading the UL 1449 Surge Suppression Rating by more than 10 percent.

E. Trim - The unit shall be constructed with surface-mounted gray baked enamel sheet metal trim and shall be top- or bottom- fed as indicated on the drawings. A directory cardholder shall be mounted on the inside of the hinged door that includes flush-type latch/lock assembly. Multi-sectional panelboards shall be as indicated on the drawings and shall be configured with feed-through lugs in either two (2) or three (3) section configurations.

F. Boxes - The unit's box shall be formed of galvanized metal and chemically cleansed, and all breaks in galvanizing shall be painted with metallic paint. Minimum size shall be 20 inches wide by 5.75 inches deep, unless otherwise indicated on the drawings. The unit's box shall not be less than 9 inches longer than standard panelboards.

G. Interiors - The unit shall have a removable interior as manufactured by General Electric, Square D, Siemens, or approved equal. The interior shall be so arranged that individual branch circuit breakers may be installed or removed without disturbing adjacent units, bus structure, or insulation.

H. Copper Main Bus - The unit shall include an all-copper main bus of the ampacity and arrangement as indicated on the drawings.

I. Circuit Breakers - The unit shall include bolt-on main, branch or sub-feed circuit breakers with frame size, poles, trip rating, and minimum interrupting rating as indicated on the drawings. Circuit breakers shall have a minimum 10,000 amperes interrupting range for 120/240, and 120/208 volt circuits, and 14,000 amperes for 277/480 and 347/600 volt circuits, or as indicated on the drawings. Circuit breakers shall be single handle, common trip for two and three pole units.

J. 200 Percent Rated Copper Neutral Bus - The unit shall include a 200 percent rated, all copper neutral bus, designed for the peculiar current demands associated with non-linear loads. The neutral bus shall include AL/CU rated mechanical solderless-type lugs in sufficient quantity and capacity as indicated on the drawings.

K. Safety Ground Bus - The unit shall include a safety ground bus with connection points equal to the number of branch breaker positions. The safety ground bus shall include AL/CU rated mechanical solderless-type lugs in sufficient quantity and capacity as indicated on the drawings.

L. Field Connections - The unit shall include mechanical solderless-type connection points and labels for each phase, neutral, safety ground, as indicated on the drawings.

M. Integral Circuit Breaker for Suppression/Filter System - The unit shall require an integral circuit breaker as a means of disconnecting the suppression/filter system for maintenance and/or test purposes without interruption of power to the facility's distribution system. The breaker shall be 2 pole for single phase (120/240 VAC) and 3-pole for three phase (120/208, 277/480, or 347/600 VAC) applications.

N. Suppression/Filter System Connections - All internal wiring associated with the suppression/filter system and subject to surge currents shall utilize low-impedance copper bus bar and/or #8 AWG copper conductor or larger. All internal connections associated with the suppression/filter system sand subject to surge currents shall be made with compression solderless type lugs and shall be bolted to the bus bars in order to reduce overall system impedance.

O. Diagnostic Monitoring Option - Unit shall be provided with the following features: Form "C" contact, audible alarm silence/test, status indicator lights, transient voltage surge counter and external test capability

PART 3 EXECUTION

3.01 INSTALLATION

A. Field Installation - The unit shall be installed in accordance with applicable national/local electrical codes and the manufacturer's recommended installation instructions.

B. Each individual circuit shall be clearly numbered on the face of the panelboard and a typewritten directory for circuit identification shall be provided by the contractor.

C. Bolt surface-mounted enclosures to mounting surface in accordance with Section 26 0548.

D. Bolt freestanding enclosures to floor in accordance with Section 26 0548.

E. Level enclosure.

F. Ground enclosure with equipment grounding conductor with TVSS feeder.

G. Adjust doors so that they open easily without dragging.

H. If enclosure is less than 6'-6" tall, install enclosure with middle of enclosure at 48 inches. If enclosure is taller than 6'-6", install enclosure with top of enclosure at 7'-6".

I. Install engraved nameplate on panels.

J. Neatly form wires in panelboards or other enclosures.

K. Touchup scratched or marred surfaces to match original finish.

3.02 FIELD QUALITY CONTROL

A. Check tightness of all conductor connections with calibrated torque wrench.

END OF SECTION

SECTION 26 5113
INTERIOR LUMINAIRES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires and accessories.

B. Exit signs.

C. Emergency lighting units.

D. Ballasts.

E. Lamps.

F. Luminaire accessories.

1.02 RELATED SECTIONS

A. Section 09 9100 - Painting: Touchup.

B. Section 26 0529 – Hangers and Supports for Electrical Systems.

C. Section 26 0533 – Raceway and Boxes for Electrical Systems.

D. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

1.03 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.

C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).

D. ANSI/NFPA 70 - National Electrical Code.

E. ANSI/NFPA 101 - Life Safety Code.

F. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

G. UL 844 - Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.

H. UL 924 - Emergency Lighting and Power Equipment.

I. UL 1570 - Fluorescent Lighting Fixtures.

J. UL 1571 - Incandescent Lighting Fixtures.

K. UL 1572 - High Intensity Discharge Lighting Fixtures.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, and performance data.

D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of each luminaire.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1 and Section 26 0500.

B. Maintenance Data: Include replacement parts list.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Conform to requirements of NFPA 101.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Furnish products as specified on Drawings.

B. Install ballasts, lamps, and specified accessories at factory.

C. All factory installed wiring shall be copper.

2.02 EXIT SIGNS

A. Manufacturers: As indicated on Drawings.

B. Description: Self-contained exit sign fixture.

C. Housing: High impact thermoplastic unless indicated otherwise on Drawings.

D. Face: As indicated on Drawings.

E. Directional Arrows: As indicated on Drawings.

F. Mounting: As indicated on Drawings.

G. Battery: Nickel-cadmium with sufficient capacity to operate lights for 90 minutes.

H. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.

I. Lamps: Manufacturers standard LED lamps.

J. Input Voltage: 120/277 volts.

2.03 EMERGENCY LIGHTING UNITS

A. Manufacturers: As indicated on the Drawings.

B. Description: Self-contained emergency lighting units.

C. Housing: High impact thermoplastic.

D. Mounting: As indicated on the Drawings.

E. Battery: Nickel-cadmium sealed maintenance fee, capable of operating lights for 90 minutes

F. Battery Charger: Dual-rate type, with sufficient capacity to recharge battery to full charge within 12 hours.

G. Lamps: Manufacturer's standard incandescent lamps.

H. Input Voltage: 120/277 volts.

I. Test Circuit: "Push-to-test" batteries and lamps.

2.04 BALLASTS

A. Fluorescent Ballast:
   1. Description: ANSI C78.1, C62.41 Category A, high power factor electronic type, less than 10 percent harmonic distortion, with resetting thermal protectors, equal to Advance Mark V.
   2. Provide ballast suitable for lamps specified.
   3. Voltage: Match luminaire voltage.
   4. Source Quality Control: Certify ballast design and construction by Certified Ballast Manufacturers, Inc. Sound level shall be Class A.
   5. Ballast shall be programmed start.

2.05 LAMPS

A. Fluorescent Lamp Manufacturers:
   1. Osram/Sylvania.
   2. Phillips.
   3. General Electric.

B. Provide lamp type specified for luminaire.

C. Fluorescent lamps shall be of the low mercury type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate and supporting grids for luminaires.

B. Examine each luminaire to determine suitability for lamps specified.

3.02 INSTALLATION

A. Install in accordance with manufacturers instructions.

B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing and as required in Section 26 0548.

C. Locate recessed ceiling luminaires as indicated on Architectural reflected ceiling plan.

D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

E. Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling T using bolts, screws, rivets, or suitable clips. On non-fire rated lay-in ceilings, Contractor shall install surface-mounted fluorescent light fixtures on 1-1/2 inch spacers.

F. Install recessed luminaires to permit removal from below. Final connections to lay-in light fixtures shall be made with 6'-0" flexible conduit from junction box to light fixture. Flexible conduit shall not go from light fixture to another light fixture.

G. Install recessed luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating at ceiling.

H. Install clips to secure recessed grid-supported luminaires in place.

I. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on Drawings as scheduled.

J. Install all accessories furnished with each luminaire or as required for a complete installation as

indicated.

K. Connect luminaires, emergency lighting units and exit signs to outlets provided under Section 26 0533 as indicated.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Bond products and metal accessories to branch circuit equipment grounding conductor.

N. Install specified lamps in each luminaire, emergency lighting unit and exit sign.

O. All fixtures shall be guaranteed for a period of one year after final acceptance and any defects in material or workmanship during this period shall be replaced or repaired to the Engineer's satisfaction without extra cost.

P. All supports, safety chains, swivels, etc. shall be furnished as required for a complete installation.

Q. Securely fasten all exit signs and emergency lighting units to surface to which they are mounted.

R. Replace all broken or cracked lens.

S. Replace all scratched or bent reflectors and doorframes.

T. Light fixtures shall be supported by lay-in ceilings or by supports to the building structure.

U. Light fixtures shall not be supported from conduits, duct or piping.

V. All recessed light fixtures shall have seismic clips firmly situated over tops of ceiling grid tees or plaster rings.

W. All light fixtures that weigh more than 50 pounds shall have a safety chain or safety cable in addition to its other support.

X. 2 by 2 light fixtures shall have louvers and lamps oriented in the same direction.

Y. Touchup scratched or marred surfaces to match original finish.

Z. Surface-mounted light fixtures shall be mounted at least 80 inches above the floor to the bottom of the light fixtures.

3.03 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

B. Turn off circuit breakers serving emergency self-contained ballasts, emergency lighting units, and self-contained exit signs to verify that emergency lighting is working properly.

3.04 ADJUSTING

A. Aim and adjust luminaires as indicated on Drawings or as directed.

B. Adjust exit sign directional arrows as indicated.

C. Relamp luminaires that have failed lamps at Substantial Completion. Fluorescent lamps that fail within the first 90 days of operation will be considered defective and shall be replaced at no extra cost.

D. If Owner complains of glare from light fixtures; add glare control, adjust light fixtures, or relocate light fixture as required to remove objectionable glare.

3.05 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

END OF SECTION

SECTION 28 3100
VOICE EVAC FIRE DETECTION AND ALARM (Addressable)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm control panel.

B. Manual fire alarm stations.

C. Automatic smoke and heat detectors.

D. Fire alarm signaling appliances.

E. Auxiliary fire alarm equipment.

1.02 RELATED SECTIONS

A. Section 09 9000 - Painting: Touchup and paint boxes.

B. Section 23 0923 - Automatic Temperature Controls.

C. Section 26 0533 – Raceway and Boxes for Electrical Systems

D. Section 26 0519 – Low-Voltage Electrical Power Connectors and Cable.

E. Section 26 0529 – Hangers and Supports for Electrical Systems.

F. Section 26 0553 - Identification for Electrical Systems: Address directory and painted boxes.

G. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems.

1.03 REFERENCES

A. Americans with Disabilities Act.

B. Arkansas State Fire Protection Code.

C. ASME A17.1 - Safety Code for Elevators and Escalators.

D. International Building Code, 2000 Edition.

E. NFPA 70 - National Electrical Code.

F. NFPA 72 - National Fire Alarm Code.

G. NFPA 101 - Life Safety Code.

H. UL 228 - Door Closers - Holders, With or Without Integral Smoke Detector.

I. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.

J. UL 268A - Smoke Detectors for Duct Application.

K. UL 521 - Heat Detectors for Fire Protective Signaling Systems.

L. UL 864 - Control Units for Fire Protective Signaling Systems.

M. UL 753 - Alarm Accessories for Automatic Water-Supply Control Valves for Fire Protection Service.

N. UL 1653 - Digital Alarm - Communicator System Units.

1.04 SYSTEM DESCRIPTION

A. Voice Evac Fire Alarm System: NFPA 72, manual and automatic local fire alarm system with connections to remote monitoring station. Connect to the existing FCI system.

1.05 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Shop Drawings: Shop drawings shall be submitted to the Architect for approval prior to installation. The submittal shall include complete schematic circuit diagrams for all equipment, address device type, label and reference detail, wiring diagrams showing connections between all system components, description of system operation, annunciator schedule, and manufacturer's literature marked to show model and catalog number for all equipment. Complete riser diagrams indicating wiring sequence of all alarm devices and control equipment shall be included with the submittal data. Submittals shall be a complete set; partial submittals will not be accepted. Electrical drawings shall not be on less than 8-1/2 inch by 11 inch sheets, and shall identify all modules if so constructed, shall be on a single sheet drawings with all circuit terminals and inter-connections identified. Six (6) copies of the shop drawings shall be submitted.

C. Product Data: Provide electrical characteristics and connection requirements.

D. Test Reports: Indicate satisfactory completion of required tests and inspections.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.06 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1 and Section 26 0500.

B. Record actual locations of initiating devices, signaling appliances, and end-of-line devices.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1 and Section 26 0500.

B. Operation Data: Operating instructions.

C. Maintenance Data: Maintenance and repair procedures.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience, and with service facilities within 150 miles of Project.

B. Installer: Company specializing in installing the products specified in this section with minimum five (5) years documented experience, and certified by State of Arkansas as fire alarm installer.

C. The Arkansas Department of Labor requires that the worker, who installs the raceways for the equipment under this Section, be paid the electrician's minimum wage rate.

1.09 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 72 and NFPA 101.

B. Furnish products listed and classified by UL and/or FM as suitable for purpose specified and indicated.

C. The Arkansas Department of Labor requires that raceways, installed for equipment under this Section, be installed by licensed electricians.

D. Conform to requirements of ASME A17.1 Safety Code for Elevators and Escalators.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of fire alarm system for one year from Date of Substantial Completion.

1.11 MONITORING SERVICE

A. Furnish monitoring service of fire alarm system for one year from Date of Substantial Completion. Including the GSM Dialer.

PART 2 PRODUCTS

2.01 MANUFACTURERS - LIMITED TO THE FOLLOWING

A. Notifier.

B. Siemens.

C. FCI.

2.02 VOICE EVAC ALARM CONTROL PANEL

A. Connect the new devices to the existing FCI fire alarm system.

2.03 INITIATING DEVICES

A. Manual Pull Station: Addressable semi-flush and surface mounted, non-coded type, double action, breakglass type manual station with breakglass rod. Provide manufacturer's standard backbox. Simplex #2099-9795, addressable type.

B. Smoke Detectors: The smoke detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use in open area protective coverage, in duct installation and duct sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system with 4 seconds. Detectors shall be programmable as application specific, selected in software for a minimum of 11 environmental fire profiles unique to the installed location. These fire profiles shall eliminate the possibility of false indications caused by duct, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The system-controlled output functions shall be from an individual or unique input of smoke obscuration, and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay and LED remote indicator at the same time. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling. Detector wiring shall not require any special shielded cable.

C. Duct Mounted Smoke Detector: Detectors shall be same as detector in Paragraph B above but shall be equipped with duct mounted housing and auxiliary contacts to shut down HVAC equipment.

D. Heat Detectors: Addressable type combination fixed temperature rate-of-rise type. Rate of rise selectable 15 degrees F or 20 degrees F per minute.

E. Auxiliary Fire Alarm Equipment: Contractor shall provide and install all controls, relays, activation devices, and addressable modules on hood fire extinguishing systems for fire alarm to receive an alarm signal when hood extinguishing systems activate. Each hood extinguishing system shall have its own address.

2.04 SIGNALING APPLIANCES

A. Alarm Lights: NFPA 72, UL 1971, Xenon, strobe lamp and flasher with minimum flash rate of 1 flash per second, red lettered "FIRE" on white lens. Units shall comply with A.D.A. requirements. Strobe candela ratings as shown on Drawings. All strobes shall be synchronized at 1 hertz.

B. Alarm Speaker Strobe: NFPA 72, ANSI 117.1, surface and/or flush type fire alarm speaker. Sound Rating: 95 dB at 10 feet (3M). Provide integral Xenon, strobe lamp and flasher with red

lettered "FIRE" on white lens where indicated. Units shall comply with A.D.A. requirements.

C. Remote Annunciator: Minimum 40 character, back-lit, alphanumeric, liquid crystal display reports point status, type of alarm, number of alarms, supervisory conditions, troubles and custom location label. Simplex #4603-9101.

2.05 FIRE ALARM WIRE AND CABLE

A. Fire Alarm Power Branch Circuits: Building wire as specified in Section 26 0519.

B. Initiating Device and Indicating Appliance Circuits: Multiplex cable as recommended by manufacturer of fire alarm system. Cable shall be red.

C. All fire alarm wire and cable shall be installed in conduit as specified in Section 26 0533.

2.06 INDIVIDUAL ADDRESSABLE MODULE

A. Provide location specific addressable to a single initiating device by monitoring N.O. dry contacts.

2.07 DOOR HOLDERS

A. Provide and install 24 volt DC door holders where indicated on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install manual station with operating handle 4 feet above floor to center of device. Install audible and visual signal devices 80 inches above floor to bottom of device or 6 inches below ceiling to top of device, whichever is lower (unless noted otherwise on Drawings).

C. Use 16 AWG minimum size conductors for fire alarm detection and signal circuit conductors. Install wiring in conduit.

D. Mount end-of-line device in control panel.

E. Make conduit and wiring connections to sprinkler flow switches and sprinkler valve tamper switches.

F. Automatic Detector Installation: Conform to NFPA 72.

G. Duct detectors shall be interlocked with air handling unit starters to de-energize units upon activation of duct detectors. All associated smoke dampers shall be interlocked to close upon activation of duct detection. Fire alarm contractor shall install wire and conduit from duct detector to air handling unit starter. Fire alarm contractor shall connect wires to duct detector. Temperature controls contractor shall connect wires at motor starter. Both contractors shall test shut down.

H. Make conduit and wiring connections to smoke damper actuator controller.

K. Signal device shall sound different from other signal devices.

L. Bolt control panel to mounting surface in accordance with Section 26 0553.

M. Door holders shall not release upon loss of AC power.

N. All wire and cables shall be installed in continuous conduit.

O. Do not peel back cable sheaths more than necessary to separate conductors.

P. Do not score copper conductors when peeling back conductor insulation. Scored conductors shall be replaced.

Q. Do not bend cables with a radius less than five times the cable's diameter. Cables bent with a

radius less than this shall be replaced.

R. Kinked, torn or twisted cable sheaths are unacceptable and shall be replaced.

S. Install cables to avoid chemicals and cold temperature bending.

T. Make sure conduits are properly reamed, terminated and brushed before installing cables or wire.

U. Verify proper conductor location at each termination before energization.

V. Maintain the following clearances to signal cables:
   1. 6 inches from power circuits other than fire alarm power circuits.
   2. 12 inches from light fixtures.
   3. 18 inches from hot water pipes, steam pipes and flues.
   4. 48 inches from transformers, meters and VFD's.

W. Paint all fire alarm boxes red where (1) concealed or (2) exposed in mechanical and electrical rooms.

X. Wall-mounted smoke detectors shall be installed with top of smoke detector between 4 inches and 12 inches down from ceiling or down from the deck where no ceilings exists.

Y. Where there are exposed bar joists, smoke detectors shall be mounted on the bottom of the deck and shall not be mounted on the bottom of the open bar joists.

Z. Where there are solid exposed joists, smoke detectors shall be mounted on the bottom of the joist and not on the ceiling or deck.

AA. Adjust door of control panel so that it opens easily without dragging.

BB. If control panel is less than 6'-6" tall, install panel with middle of panel at 48 inches. If panel is latter than 6'-6", install panel with top of panel at 7'-6".

CC. Install remote annunciators with middle of annunciator at 48 inches, unless mounted above a countertop.

DD. Install directory of addresses and corresponding devices and locations at control panel.

EE. Neatly form all wires and cables in control panel.

FF. Touchup scratched or marred surfaces to match original finish.

3.02 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 1.

B. Test in accordance with NFPA 72 and local fire department requirements in the presence of the Owner's representative and the local fire marshal. Upon completion of successful test, the Contractor shall certify in writing to the Owner and General Contractor. Certificate of completion shall be prepared as required in NFPA 72. Contractor shall sign and date all pertinent information.

C. Check tightness of all conductor connections.

3.03 DEMONSTRATION

A. Provide a minimum of 6 hours of systems demonstration and training to Owner's designated representatives.

B. Demonstrate normal and abnormal modes of operation, and required responses to each.

3.04 WARRANTY

A. The Contractor shall warranty the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

B. The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year in compliance with NFPA 72 guidelines. Provide smoke detector inspection forms to Owner with information as outlined in NFPA 72.

C. A fire alarm certificate of completion form shall be issued to the Owner with all required information as outlined in NFPA 72.

END OF SECTION

SECTION 31 2200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal and storage and re-spread of topsoil.

B. Rough grading the site for sidewalks, mechanical pads, etc..

C. Finish grading and topsoil placement throughout the entire course of construction of the project.

1.02 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect plants, lawns, and other features to remain as a portion of final landscaping.

C. Protect bench marks, survey control points, existing structures, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 MATERIALS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

D. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Stockpile excavated topsoil on site.

B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

B. Place topsoil where required to level finish grade.

C. Place topsoil during dry weather.

D. Remove roots, weeds, rocks, and foreign material while spreading.

E. Near plants spread topsoil manually to prevent damage.

F. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

G. Lightly compact placed topsoil.

H. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 TOLERANCES

A. Top Surface of Finish Grade: Plus or minus 1/2 inch.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 CLEANING

A. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

C. Trenching for storm drainage and erosion control structures.

1.02 RELATED REQUIREMENTS

A. Section 00300 - Available project information: Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 01 5713 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.

C. Section 31 2200 - Grading: Grading.

D. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

E. Section 31 2323 - Fill: Fill materials, filling, and compacting.

F. Section 33 4100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Steiling Architecture.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify Steiling Architecture of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to conform to requirements as set forth by OSHA standards.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

H. Grade top perimeter of excavation to prevent surface water from draining into excavation.

I. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 2200.

J. Remove excess excavated material and stockpile at nearby location as directed by Owner.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 31 2316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Site grading.

B. Section 31 2316 - Excavation: Building and foundation excavating.

C. Section 31 2323 - Fill: Backfilling at building and foundations.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 4 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.04 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.05 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where designated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

D. Protect plants, lawns, and other features to remain.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Refer to Section 31 2323 Fill for required fill materials.

2.02 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. See Section 31 2200 for additional requirements.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities.

3.03 TRENCHING

A. Notify Steiling Architecture of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Trenching and excavations shall address safety concerns and comply with OSHA regulations.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 ft , unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

F. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 95

G. Compaction Density Unless Otherwise Specified or Indicated: Refer to Section 31 2323 Fill and Backfill.

H. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Utility Piping, Conduits, and Duct Bank :
   1. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

B. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:

3.07 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with applicable references.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.09 CLEANING

A. Stockpile unused materials where directed by the Owner; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 2323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, slabs-on-grade, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

D. Filling excavations generated from removal of soft spots on site.

1.02 RELATED REQUIREMENTS

A. Section 00300 - Available project information: Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 01 5713 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.

C. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

D. Section 03 3000 - Cast-in-Place Concrete.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

C. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

D. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

E. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.05 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

C. Compaction Density Test Reports.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill:
   1. Refer to Section 003100: Geotechnical Investigation, Analysis and Recommendations:
   2. Compaction: 95% Standard Proctor.
   3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   4. On-site or off-site fill shall consist of Sandy Clay (CL); Clayey Sand (SC); Silty Sand (SM) and/or Clayey Gravel (GC) conforming to the description included in ASTM D2487.

B. Structural Fill:
   1. Refer to Section 003100: Geotechnical Investigation, Analysis and Recommendations
   2. Compaction: 95% Standard Proctor
   3. Off-site fill shall consist of Silty Sand (SM); Sandy Clay (CL); Clayey Sand (SC); and/or Clayey Gravel (GC) conforming to the description included in ASTM D2487.

C. Concrete for Fill: Minimum compressive strength of 2500 psi at 28 days.

D. Granular Fill, Drainage Fill, or Capillary Water Barrier indicated under concrete floor slabs shall consist of a four inch layer of No. 57 aggregate; or a concrete sand conforming to ASTM C33; or a naturally occurring granular material, provided material has less than 5% passing through a No. 200 sieve.

E. Sand: Conforming to State of Arkansas Highway Department standard.

F. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; Acidity range (pH) of minimum 5.5 and maximum 7.0.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out or rework and compact soft areas of subgrade not capable of compaction in place. Backfill with Structural fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 ft , unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 98 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under slabs-on-grade and similar construction: 95 percent of maximum dry density.
   2. At other locations: 95 percent of maximum dry density.
   3. Topsoil for planting areas: 90 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

L. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Steiling Architecture. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D3017, ASTM D6938, ASTM D1556, ASTM D2167, ASTM D3017, ASTM D6938, ASTM D1556, ASTM D2167, ASTM D3017, ASTM D6938, ASTM D1556, ASTM D2167, ASTM D3017, or ASTM D6938.

C. Perform density testing on compacted fill in accordance with applicable references.

D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").

E. If tests indicate work does not meet specified requirements, remove work, replace and retest.

F. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.05 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 1313
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks on grade.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving and preparation of subsoil at pavement perimeter for planting.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 305R - Hot Weather Concreting; 2010.

D. ACI 306R - Cold Weather Concreting; 2010.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

J. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

K. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

L. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

M. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

N. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

O. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with Arkansas State Highway and Transportation Dept. Standard Specification for Highway Construction Section 802, Concrete for Structures, 2003 Edition.

B. Obtain cementitious materials from same source throughout.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen, and ambient temperature shall be at least 40 degrees F and rising.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Refer to Schedule at end of this Section.

C. Concrete Sidewalks and pads: 4,000 psi 28 day concrete, 4 inches thick, 6/6 - W2.9 x W2.9 sheet mesh reinforcement, wood float finish.

2.02 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 1/2 inch.

2.03 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Cement: ASTM C150/C150M Normal - Type I portland type, grey color.

C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ACI 211.1

G. Water: Clean, and not detrimental to concrete.

H. Air-Entraining Admixtures: ASTM C260/C260M.

2.04 ACCESSORIES

A. Curing Compound: ASTM C 309, Type 1, Class A.

2.05 CONCRETE MIX DESIGN

A. Concrete Strength: Establish required average strength for each type of concrete on the basis of trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Steiling Architecture for preparing and reporting proposed mix designs.

B. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4000 psi.
   2. Fly Ash Content: Not Allowed.
   3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
   4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
   5. Cement Content: Minimum 5 1/2 sack per cubic yard mixture.
   6. Water-Cement Ratio: Maximum 40 percent by weight.
   7. Total Air Content: 5 plus or minus 1 percent, determined in accordance with ASTM C173/C173M.
   8. Maximum Slump: 5 inches.
   9. Maximum Aggregate Size: 1-1/2 inch.

2.06 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted base is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Notify Steiling Architecture minimum 24 hours prior to commencement of concreting operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 REINFORCEMENT

A. Place reinforcement at midheight of slabs-on-grade.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

D. Provide doweled joints 12 inch on center at with one end of dowel set in capped sleeve to allow longitudinal movement.

3.05 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.06 PLACING CONCRETE

A. Coordinate installation of snow melting components.

B. Place concrete in accordance with State of Arkansas Highways Standard Specifications.

C. Place concrete using the slip form technique.

D. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

3.07 JOINTS

A. Paving Contractor shall provide to Architect a proposed paving joints layout drawing for review and approval prior to beginning of any paving work.

B. Provide expansion joints:
   1. Walks and pads: Provide 1/2 inch wide expansion joints at (+-)30 foot intervals and to separate paving from vertical surfaces, other components, and where noted on plans.
   2. Secure to resist movement by wet concrete.

C. Provide scored joints.
   1. Provide sawn joints in walks at spacing equal to walk width.
   2. Provide equally spaced sawn joints in walks at 6 feet maximum.
   3. Saw cut joints as quickly as possible after placing. Time delay after placing to saw cutting is expected to be no longer than 6 hours. Notify Architect if longer time will be required. Use 3/16 inch thick blade, cut into one third depth of slab thickness, unless noted otherwise.

D. Provide keyed joints as indicated or required for proper installation.

3.08 FINISHING

A. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 JOINT SEALING

A. Seal joints as per manufacturer's instructions.

3.10 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

3.11 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.
   2. Submit proposed mix design of each class of concrete to Architect and testing firm for review prior to commencement of concrete operations.
   3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure four concrete test cylinders. Obtain test samples for every 50 cu yd or less of each class of concrete placed each day.
   1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
   2. Perform one slump test for each set of test cylinders taken.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.12 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

3.13 SCHEDULES

A. Refer to Contact Drawings for scheduled areas of paving.

B. Concrete walks, mechanical pads, etc: Standard 4,000 psi 28 day concrete, 4 inches thick, 6 x 6 W2.9 x W2.9 sheet mesh reinforcement on specified aggregate base, light broom finish.

END OF SECTION

SECTION 32 3119
DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Decorative steel fences.
   1. Refer to contract drawings for specific locations.

1.02 RELATED REQUIREMENTS

A. Section 03 3300 - Cast-in-Place Concrete.

B. Section 31 2316 - Excavation.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.

C. ASTM D523 - Standard Test Method for Specular Gloss; 2014.

D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint; 2002 (Reapproved 2009).

E. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013.

F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.

G. ASTM D2244 - Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates; 2011.

H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2010).

I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test; 2009.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Installer's Qualification Statement.

C. Manufacturer's Warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original

purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

C. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Decorative Metal Fences:
   1. Ameristar Perimeter Security, USA: www.ameristarfence.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FENCES

A. The fence system shall conform to Montage Industrial Welded and Rackable (ATF – All Terrain Flexibility) Ornamental Steel, Classic design, extended picket bottom rail treatment, 3-Rail style manufactured by Ameristar Fence Products, Inc., in Tulsa, Oklahoma.
   1. Fence Height: 6'-0".
   2. Gate Opening Width: 10'-0" clear (Pair of 5'-0"w x 6'-0" gates typical)

2.03 MATERIAL

A. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (344 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft2 (184 g/m2), Coating Designation G-60. A minimum of 62% of the steel material shall be derived from recycled scrap metal.

B. Material for pickets shall be 1" square x 16 Ga. tubing. The rails shall be steel channel, 1.75" x 1. 75" x .105". Picket holes in the rail shall be spaced 4.715" o.c. For fence systems up to and including 6 feet tall, posts shall be a minimum of 2-1/2" square x 14 Ga. For fence systems 7 feet tall and 8' tall, posts shall be a minimum of 2-1/2" square x 12 Ga. Gate posts shall meet the minimum requirements of Table 1.

2.04 FABRICATION

A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar's proprietary fusion welding process, thus completing the rigid panel assembly (Note: The process produces a virtually seamless, spatter-free good-neighbor appearance, equally attractive from either side of the panel).

C. The manufactured panels and posts shall be subjected to an inline electrodeposition coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black. The coated panels and posts shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2 (Note: The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408).

D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.

E. Swing gates shall be fabricated using 1.75" x 14ga Forerunner double channel rail, 2" sq. x 11ga. gate ends, and 1" sq. x 14ga. pickets. Gates that exceed 6' in width will have a 1.75" sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates will be welded at each upright to rail intersection. Cable kits will be provided for additional trussing for all gates leaves over 6'.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Steiling Architecture of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the construction plans.

B. Clean surfaces thoroughly prior to installation.

3.03 FENCE INSTALLATION

A. Fence post shall be spaced at nominal 8'-0" o.c., plus or minus ½". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36". The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

B. Set fence posts in accordance with the manufacturer recommended spacing.

3.04 FENCE INSTALLATION MAINTENANCE

A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 32 9223
SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fertilizing.

B. Sod installation.

1. Contractor shall sod all areas within (30) thirty feet outside the lines of new building construction. This work will be completed to the satisfaction of the Owner and Architect.
2. Refer to Section 32 9230 Hydraulic Seeding for seeding of other areas disturbed by any work under this Contract.

C. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

B. Section 31 2323 - Fill: Topsoil material.

1.03 REFERENCE STANDARDS

A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Certification: Submit certification of grass species and location of sod source.

1.05 QUALITY ASSURANCE

A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Arkansas.

1.06 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver sod in rolls. Protect exposed roots from dehydration.

B. Do not deliver more sod than can be laid within 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: TPI, Certified Turfgrass Sod quality; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

1. Tifway 419 Hybrid Bermuda

B. Fertilizer: as; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.

2.02 ACCESSORIES

A. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.

2.03 HARVESTING SOD

A. Machine cut sod and load on pallets in accordance with TPI Guidelines.

B. Cut sod in area not exceeding 1 sq yd, with minimum 1/2 inch and maximum 1 inch topsoil base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.02 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.03 LAYING SOD

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod immediately after delivery to site to prevent deterioration.

C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

D. On slopes 6 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.

E. Prior to placing sod, on slopes exceeding 8 inches per foot or where indicated, place wire mesh over topsoil. Securely anchor in place with wood pegs sunk firmly into the ground.

F. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

G. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.04 MAINTENANCE

A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove irregularities.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

G. Immediately replace sod to areas that show deterioration or bare spots.

H. Protect sodded areas with warning signs during maintenance period.

END OF SECTION